

**ECONOMIC AND SOCIAL COMMISSION FOR
ASIA AND THE PACIFIC**

ANNUAL REPORT
19 May 2005–12 April 2006

ECONOMIC AND SOCIAL COUNCIL
OFFICIAL RECORDS, 2006

SUPPLEMENT No. 19



UNITED NATIONS

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NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

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CONTENTS

	<i>Paragraphs</i>	<i>Page</i>
Abbreviations		vi
Introduction	1	1
<i>Chapter</i>		
I. ISSUES BROUGHT TO THE ATTENTION OF THE ECONOMIC AND SOCIAL COUNCIL		1
Resolutions and decisions brought to the attention of the Economic and Social Council		1
A. Resolutions		1
B. Decisions		1
II. WORK OF THE COMMISSION SINCE THE SIXTY-FIRST SESSION	2-5	2
A. Activities of subsidiary bodies	2-3	2
B. Other activities	4	2
C. Relations with other United Nations programmes	5	2
III. SIXTY-SECOND SESSION OF THE COMMISSION	6-416	3
A. Attendance and organization of work	6-19	3
B. Agenda	20	4
C. Account of proceedings	21-416	4
Message from the Secretary-General of the United Nations	24-26	5
Statement by the Executive Secretary of ESCAP	27-31	5
Inaugural address by the President of Indonesia	32-40	5
Policy issues for the ESCAP region	41-123	6
Policy statement by the Executive Secretary	41-51	6
Implications of recent economic and social developments	52-71	7
Strengthening Pacific island developing countries and territories through regional cooperation and the Pacific Leaders' United Nations ESCAP Special Session	72-93	9
Enhancing regional cooperation in infrastructure development, including that related to disaster management	94-123	10
Implementation of the Jakarta Declaration on Millennium Development Goals in Asia and the Pacific: the Way Forward 2015	124-144	13
Key developments and activities at the regional level	145-247	15
Poverty reduction	145-170	15
Key issues relating to poverty reduction	145-170	15
Managing globalization	171-225	17
Trade and investment	173-186	17
Transport infrastructure and facilitation and tourism	187-203	18
Environment and sustainable development	204-219	20
Information, communication and space technology	220-225	21
Emerging social issues	226-247	21

CONTENTS (continued)

	<i>Paragraphs</i>	<i>Page</i>
Least developed countries, landlocked developing countries and small island developing States	248-265	23
Management issues	266-319	25
Programme performance report for 2004-2005	266-273	25
Proposed programme changes for 2006-2007	274-278	25
Draft strategic framework for the biennium 2008-2009	279-284	25
ESCAP guidelines for programme monitoring, review and evaluation	285-291	26
Work of the regional institutions	292-307	26
2005 World Summit Outcome: implications for the work of ESCAP	308-319	27
Technical cooperation activities of ESCAP and announcement of intended contributions.....	320-348	28
Activities of the Advisory Committee of Permanent Representatives and Other Representatives Designated by Members of the Commission.....	349-358	31
Reports of regional intergovernmental bodies	359-382	32
Coordinating Committee for Geoscience Programmes in East and Southeast Asia	359-364	32
Mekong River Commission.....	365-369	32
Typhoon Committee	370-374	33
Panel on Tropical Cyclones	375-382	33
Date, venue and theme topic of the sixty-third session of the Commission	383-387	33
Ministerial Round Table on Enhancing Regional Cooperation in Infrastructure Development, including that Related to Disaster Management	388-414	34
Special session on the Intergovernmental Agreement on the Trans-Asian Railway Network	414	37
Other matters: Special briefing on avian influenza	415-416	37
 IV. RESOLUTIONS AND OTHER DECISIONS ADOPTED BY THE COMMISSION AT ITS SIXTY-SECOND SESSION		38
A. Resolutions		38
62/1. Achieving the Millennium Development Goals in the ESCAP region		38
62/2. Jakarta Declaration on enhancing regional cooperation in infrastructure development, including that related to disaster management		40
62/3. Implementation of the Plan of Action for Sustainable Tourism Development in Asia and the Pacific, phase II (2006-2012) and the Regional Action Programme for Sustainable Tourism Development		41
62/4. Intergovernmental Agreement on the Trans-Asian Railway Network		46
62/5. Building the information society in Asia and the Pacific.....		73
62/6. Managing globalization through strengthened regional cooperation in trade and investment		74
62/7. Strengthening regional cooperation and coordination of early warning system arrangements for tsunamis through the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia.....		75
62/8. Implementation of the International Plan of Action for the United Nations Literacy Decade		76

CONTENTS *(continued)*

	<i>Page</i>
62/9. Regional follow-up to the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States	77
62/10. Strengthening statistical capacity in Asia and the Pacific	78
62/11. Implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010.....	79
62/12. Strengthening Pacific island developing countries and territories through regional cooperation	80
B. Other decisions	81
Decision 62/1.	
Deferment of consideration of the draft resolution on the establishment of the Asian and Pacific Centre for ICST-enabled Disaster Management (APIDM).....	81
Decision 62/2.	
Procedure followed in the adoption of the report of the Commission on its sixty-second session	81

Annexes

I. Statements of programme budget implications of actions and proposals of the Commission	82
II. Meetings of subsidiary bodies	109
III. Documents submitted to the sixty-second session of the Commission	111
IV. List of publications, meetings and advisory services in 2005.....	113
V. Terms of reference of the Economic and Social Commission for Asia and the Pacific.....	124
VI. Rules of procedure of the Economic and Social Commission for Asia and the Pacific.....	126

ABBREVIATIONS

ACPR	Advisory Committee of Permanent Representatives and Other Representatives Designated by Members of the Commission
ADB	Asian Development Bank
APCICT	Asian and Pacific Training Centre for Information and Communication Technology for Development
APCTT	Asian and Pacific Centre for Transfer of Technology
ASEAN	Association of Southeast Asian Nations
CAPSA	Centre for Alleviation of Poverty through Secondary Crops Development in Asia and the Pacific
CCOP	Coordinating Committee for Geoscience Programmes in East and Southeast Asia
ECO	Economic Cooperation Organization
FDI	foreign direct investment
GNP	gross national product
ICST	information, communication and space technology
ICT	information and communication technology
ILO	International Labour Organization
IMF	International Monetary Fund
ITU	International Telecommunication Union
ODA	official development assistance
SIAP	Statistical Institute for Asia and the Pacific
SMEs	small and medium-sized enterprises
UNAPCAEM	United Nations Asian and Pacific Centre for Agricultural Engineering and Machinery
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UN-EPOC	United Nations ESCAP Pacific Operations Centre
WHO	World Health Organization
WMO	World Meteorological Organization
WTO	World Trade Organization

Introduction

1. The annual report of the Economic and Social Commission for Asia and the Pacific, which covers the period from 19 May 2005 to 12 April 2006, was adopted unanimously by the Commission at the fifth plenary meeting of its sixty-second session on 12 April 2006.

Chapter I

ISSUES BROUGHT TO THE ATTENTION OF THE ECONOMIC AND SOCIAL COUNCIL

Resolutions and decisions brought to the attention of the Economic and Social Council

At its sixty-second session, ESCAP adopted the following 12 resolutions and 2 decisions, which are brought to the attention of the Council.

A. Resolutions

- | | |
|--|---|
| 62/1. Achieving the Millennium Development Goals in the ESCAP region | 62/7. Strengthening regional cooperation and coordination of early warning system arrangements for tsunamis through the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia |
| 62/2. Jakarta Declaration on enhancing regional cooperation in infrastructure development, including that related to disaster management | 62/8. Implementation of the International Plan of Action for the United Nations Literacy Decade |
| 62/3. Implementation of the Plan of Action for Sustainable Tourism Development in Asia and the Pacific, phase II (2006-2012) and the Regional Action Programme for Sustainable Tourism Development | 62/9. Regional follow-up to the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States |
| 62/4. Intergovernmental Agreement on the Trans-Asian Railway Network | 62/10. Strengthening statistical capacity in Asia and the Pacific |
| 62/5. Building the information society in Asia and the Pacific | 62/11. Implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010 |
| 62/6. Managing globalization through strengthened regional cooperation in trade and investment | 62/12. Strengthening Pacific island developing countries and territories through regional cooperation |

B. Decisions

- | | |
|--|--|
| 62/1. Deferment of consideration of the draft resolution on the establishment of the Asian and Pacific Centre for ICST-enabled Disaster Management (APIDM) | 62/2. Procedure followed in the adoption of the report of the Commission on its sixty-second session |
|--|--|

Chapter II

WORK OF THE COMMISSION SINCE THE SIXTY-FIRST SESSION

A. Activities of subsidiary bodies

2. During the period under review, the following subsidiary bodies held meetings: Committee on Managing Globalization, Committee on Emerging Social Issues, Committee on Poverty Reduction, Intergovernmental Meeting to Develop the Intergovernmental Agreement on the Trans-Asian Railway Network, High-level Intergovernmental Meeting on Sustainable Tourism Development and Special Body on Pacific Island Developing Countries.

3. The dates, bureaux and document symbols of the reports of the meetings are given in annex II to the present report. The reports of those bodies reflect the discussions held, the agreements reached and the decisions taken by them.

B. Other activities

4. Lists of publications issued, meetings held and advisory services provided in the calendar year 2005 are given in annex IV to the present report.

C. Relations with other United Nations programmes

5. The secretariat maintained close and regular liaison with United Nations Headquarters and cooperated with the departments concerned, as well as with the secretariats of the other regional commissions, on projects of common interest.

Chapter III

SIXTY-SECOND SESSION OF THE COMMISSION

A. Attendance and organization of work

6. The sixty-second session of the Commission was held at the Jakarta Convention Centre, Jakarta, from 6 to 12 April 2006. The session comprised two parts. The Senior Officials' Meeting was held from 6 to 8 April 2006 and the Ministerial Meeting from 10 to 12 April 2006.

7. The session was attended by representatives of the following members and associate members:

<i>Members</i>	Nauru
Afghanistan	Nepal
Armenia	Netherlands
Australia	Pakistan
Azerbaijan	Palau
Bangladesh	Papua New Guinea
Bhutan	Philippines
Brunei Darussalam	Republic of Korea
Cambodia	Russian Federation
China	Samoa
Democratic People's Republic of Korea	Singapore
Fiji	Solomon Islands
France	Sri Lanka
India	Thailand
Indonesia	Timor-Leste
Iran (Islamic Republic of)	Tonga
Japan	Turkey
Kazakhstan	Tuvalu
Kiribati	United Kingdom of Great Britain and Northern Ireland
Kyrgyzstan	United States of America
Lao People's Democratic Republic	Uzbekistan
Malaysia	Vanuatu
Maldives	Viet Nam
Marshall Islands	<i>Associate members</i>
Micronesia (Federated States of)	Hong Kong, China
Mongolia	Macao, China
Myanmar	New Caledonia
	Niue

8. By virtue of rule 3 of the Commission's rules of procedure, representatives of Austria, the Czech Republic, Germany, Israel, Italy, Mexico and Slovakia attended. A representative of the Holy See also attended.

9. The session was attended by a representative of the Regional Commissions New York Office.

10. Representatives of the following United Nations bodies attended: Office of the United Nations

High Commissioner for Human Rights, Secretariat of the United Nations Convention to Combat Desertification, United Nations Conference on Trade and Development, International Trade Centre UNCTAD/WTO, United Nations Development Fund for Women, United Nations Development Programme, United Nations Environment Programme and United Nations Human Settlements Programme.

11. Representatives of the following specialized agencies were present in a consultative capacity: International Labour Organization, United Nations Educational, Scientific and Cultural Organization, World Health Organization, World Bank, International Monetary Fund, Universal Postal Union, International Telecommunication Union, World Meteorological Organization, International Fund for Agricultural Development and United Nations Industrial Development Organization.

12. Representatives of the following inter-governmental organizations attended as observers: Asian and Pacific Coconut Community, Asian Development Bank, Asian Productivity Organization, Asia-Pacific Economic Cooperation, Colombo Plan Secretariat, International Organization for Migration, Mekong River Commission, Pacific Islands Forum Secretariat and South Asia Cooperative Environment Programme.

13. Observers were present from the following non-governmental organizations in general consultative status: International Confederation of Free Trade Unions, Muslim World League and World Assembly of Youth; and from the following organizations in special consultative status: ActionAid International and Pan-Pacific and South-East Asia Women's Association.

14. Representatives of the ASEAN Foundation, Centre for Agriculture Policy Studies, Colombo Plan Staff College for Technician Education, Indonesian Trade Union Congress, International Development Research Centre and International Federation of Red Cross and Red Crescent Societies also attended the session.

15. The list of participants is given in document ESCAP(62)/INF.1/Rev.2.

16. In accordance with rule 13 of its rules of procedure, the Commission elected H.E. Mr. N. Hasan Wirajuda (Indonesia) Chairperson.

17. Following its past practice, the Commission decided to elect the following heads of delegations Vice-Chairpersons: H.E. Mr. Nazir Ahmad Shahidi (Afghanistan), H.E. Mr. Arman Kirakossian (Armenia),

H.E. Mr. Tahir Yagub Budagov (Azerbaijan), H.E. Mr. M. Saifur Rahman (Bangladesh), H.E. Mr. Khy Tainglim (Cambodia), H.E. Mr. Cui Tiankai (China), Hon. Kaliopate Tavola (Fiji), H.E. Mr. Kamal Nath (India), H.E. Mr. Boediono (Indonesia), H.E. Mr. Ali Taiebnia (Islamic Republic of Iran), H.E. Ms. Akiko Yamanaka (Japan), H.E. Mr. Askar Beshimov (Kyrgyzstan), H.E. Mr. Phongsavath Boupha (Lao People's Democratic Republic), Hon. Senator Dato Sri Mohd. Effendi Norwawi (Malaysia), Hon. Hamdun Hameed (Maldives), H.E. Mr. Gerald M. Zackios (Marshall Islands), H.E. Mr. Tsegmid Tsengel (Mongolia), H.E. U Soe Tha (Myanmar), H.E. Mr. David Adeang (Nauru), Hon. Mr. Shankar Prasad Sharma (Nepal), H.E. Mr. Paul Tiensten (Papua New Guinea), H.E. Mr. Hermogenes E. Ebdane, Jr. (Philippines), H.E. Mr. Kyuhyung Lee (Republic of Korea), H.E. Mr. Aleksander Yakovenko (Russian Federation), Hon. Sarath Amunugama (Sri Lanka), Hon. Sato Kilman (Vanuatu) and H.E. Mr. Dao Viet Trung (Viet Nam).

18. The Senior Officials' Meeting was divided into three Committees of the Whole. Committee of the Whole I elected H.E. Mr. Mochamad S. Hidayat (Indonesia) Chairperson and H.E. Ms. Adi Litia Samanunu Qalirea Talakuli Cakobau (Fiji) and Mr. Purushottam Ojha (Nepal) Vice-Chairpersons. Committee of the Whole II elected Ms. Nounnea Simi (Samoa) Chairperson and Mr. Tajamul Altaf (Pakistan) and Mr. Chamnan Wattanasiri (Thailand) Vice-Chairpersons. Committee of the Whole III elected Mr. A.M.D. Bandusena (Sri Lanka) Chairperson and H.E. Mr. Yaichil Batsuuri (Mongolia) and Ms. Caroline Sylvia Tupoulahi-Fusimalohi (Tonga) Vice-Chairpersons.

19. The Commission also constituted a Working Group on Draft Resolutions, under the chairmanship of Mr. Zhang Wanhai (China), to consider draft resolutions submitted during the session. Mr. Perry Head (Australia) and Mr. Huseyin Ergani (Turkey) were elected Vice-Chairpersons of the Working Group.

B. Agenda

20. The Commission adopted the following agenda:

1. Opening of the session:
 - (a) Opening addresses;
 - (b) Election of officers;
 - (c) Adoption of the agenda.
2. Policy issues for the ESCAP region:
 - (a) Implications of recent economic and social developments;
 - (b) Strengthening Pacific island developing countries and territories through regional cooperation;

(c) Enhancing regional cooperation in infrastructure development, including that related to disaster management.

3. Implementation of the Jakarta Declaration on Millennium Development Goals in Asia and the Pacific: the Way Forward 2015.
4. Key developments and activities at the regional level:
 - (a) Poverty reduction;
 - (b) Managing globalization;
 - (c) Emerging social issues.
5. Least developed countries, landlocked developing countries and small island developing States.
6. Management issues:
 - (a) Programme performance report for the biennium 2004-2005;
 - (b) Programme changes for the biennium 2006-2007;
 - (c) Draft strategic framework for the biennium 2008-2009;
 - (d) Monitoring and evaluation guidelines;
 - (e) Work of the regional institutions;
 - (f) 2005 World Summit Outcome: implications for the work of ESCAP.
7. Technical cooperation activities of ESCAP and announcement of intended contributions.
8. Activities of the Advisory Committee of Permanent Representatives and Other Representatives Designated by Members of the Commission.
9. Reports of regional intergovernmental bodies.
10. Date, venue and theme topic for the sixty-third session of the Commission.
11. Other matters.
12. Adoption of the report of the Commission.

C. Account of proceedings

21. The Acting Chairperson of the sixty-first session, H.E. Mr. Shankar Prasad Sharma (Nepal), called the meeting to order and chaired the opening session. The Executive Secretary of ESCAP read out a message from the Secretary-General of the United Nations and delivered a statement.

22. H.E. Mr. Susilo Bambang Yudhoyono, President of Indonesia, delivered the inaugural address

and declared open the Ministerial Meeting of the sixty-second session and the Pacific Leaders' United Nations ESCAP Special Session (PLUS).

23. PLUS was held following the inaugural session. It was presided over by H.E. Mr. Kessai Note, President of the Republic of the Marshall Islands, and moderated by the Executive Secretary of ESCAP. The summary of discussions of PLUS is contained in the section of the present report on Strengthening Pacific island developing countries and territories through regional cooperation and PLUS.

Message from the Secretary-General of the United Nations

24. In his message, the Secretary-General urged the representatives to use the meeting to sustain the momentum generated by the World Summit held in New York in September 2005. While world leaders had not achieved everything they might have hoped for, they had agreed on progress across a broad front. They had given a resounding reaffirmation of the Millennium Development Goals, with developing countries committing themselves to producing by the end of 2006 national strategies for reaching the Goals. Furthermore, world leaders had achieved a breakthrough on the responsibility to protect a population when it was threatened with genocide, ethnic cleansing or crimes against humanity. In that regard, all Member States had expressed the will to act collectively through the Security Council. The creation of the Peacebuilding Commission and the Human Rights Council were major milestones.

25. The World Summit also generated a much-improved emergency fund that would enable a prompt response to humanitarian disasters, and it endorsed the new Democracy Fund. The previous month, the Secretary-General had placed before the United Nations membership a new set of proposals for a radical overhaul of the management of the Organization. Building on previous rounds of reform, the goal of the Secretary-General was a more transparent, accountable and effective instrument of service to humankind.

26. The Secretary-General noted that the reforms of ESCAP in recent years were an important part of efforts to adapt the United Nations. ESCAP, together with the other four regional commissions, was taking steps to strengthen management, improve coordination and ensure that its work reflected the priorities of Member States. The Secretary-General thanked ESCAP for its contribution to system-wide reform and offered his best wishes for a productive session.

Statement by the Executive Secretary of ESCAP

27. The Executive Secretary extended a warm welcome to all those attending the sixty-second session of the Commission and expressed deep gratitude to His Excellency President Susilo Bambang Yudhoyono for the hosting of the sixty-second session of the

Commission by the Government of Indonesia, and for inaugurating the Ministerial Meeting.

28. The Executive Secretary paid a warm tribute to the Ministry of Foreign Affairs of Indonesia, under the leadership of H.E. Mr. Hassan Wirajuda, for excellent collaboration in the organization of the session.

29. The Executive Secretary also extended a special welcome to the Presidents of Kiribati and the Marshall Islands, the Prime Minister of Tuvalu and the Vice-Presidents of the Federated States of Micronesia and Palau, as well as senior officials from the Pacific island developing countries and territories.

30. The Executive Secretary informed the Commission that it was the third time in the history of ESCAP that the Government of Indonesia had hosted a Commission session. The first occasion had been in 1953 when the ninth session had been held in Bandung. In 1988, the forty-fourth session had been held in Jakarta.

31. The Executive Secretary further stated that the presence of President Susilo Bambang Yudhoyono reaffirmed Indonesia's commitment to the United Nations and its support for ESCAP as the secretariat of the Governments of the Asian and Pacific region. That support was particularly valued at a time when the entire United Nations system, including ESCAP and the other four regional commissions, was engaged in serious reform to adapt to the challenges of the twenty-first century and to address more effectively and efficiently the priorities of Member States.

Inaugural address by the President of Indonesia

32. On behalf of the people of Indonesia, the President extended his warmest welcome to all those attending the session and acknowledged with pleasure the presence of Pacific leaders.

33. The President underscored the global pursuit of the Millennium Development Goals as the greatest project on which humanity had ever embarked, one that was more ambitious than the struggle for freedom that had defined the twentieth century.

34. The quest for the Millennium Development Goals was an ambitious struggle to spread opportunity and hope more evenly throughout humanity, with concrete practical objectives, and with a clear timetable. Resources to achieve the Goals were available, provided there was sustained political will and a strategy for allocating the necessary resources.

35. The key to progress was in good governance which, if employed well, would resolve national problems, harness potential and turn weakness into strength.

36. The President observed that globalization had brought with it the need to intensify the cooperation and partnership networks at the subregional, regional and interregional levels. Furthermore, while many felt left

out by globalization, some found opportunities and tools of empowerment to bring about a more level playing field. Information and communication technology, for example, could revolutionize education, redefine the life of the individual and empower communities. The President believed that, if the twentieth century had been an era of big ideas, such as nationalism, capitalism, socialism and industrialization, the twenty-first century was an era during which change would be propelled by small gadgets. The President expressed the hope that ESCAP could play a role in helping Governments and citizens to harness the powerful force of globalization gracefully and intelligently.

37. The President expressed the view that Asia and the Pacific also needed to address an important emerging social issue of the times: tolerance. That issue was linked to current conflicts, most of which were internal conflicts related to ethnicity or religion or both. Economic marginalization, social dislocation, globalization, religious orthodoxy and narrow nationalism were factors that would add greater urgency to the promotion of tolerance. The President held the view that "development" in the twenty-first century was not just about poverty alleviation or about protecting the environment and sustainability, but it was also about building tolerance. The President suggested that ESCAP could help communities in the region to achieve the kind of social progress that could make them bastions of resilience and tolerance, in which diversity was celebrated as a source of strength and dynamism.

38. Yet the region was vulnerable to natural disasters; the death toll wrought by the December 2004 tsunami included over 200,000 people in Aceh and Nias, Indonesia. The President, in informing the Commission that the devastated communities were experiencing a rebirth, expressed the hope that the historic peace accord that had been made in Aceh would permanently end a conflict that had lasted 30 years. Given the significance of the tsunami, there was a need to intensify regional collaboration on disaster management.

39. Citing the historical and cultural links of Indonesia with the Pacific, the President stated that the country was linked to the Pacific in many positive ways and was well positioned to serve as the Pacific's gateway to Asia. Indonesia was a founding member of the South-West Pacific Dialogue and was actively involved in the Pacific Islands Forum as a dialogue partner. By collaborating in the promotion of economic growth, sustainable development, good governance and security, all of which were important pillars of the Pacific Plan for Strengthening Regional Cooperation and Integration adopted by the Forum in October 2005, ESCAP members and the Pacific island nations could strengthen regional cooperation to manage globalization. Indonesia could share with the Pacific islands its experiences in fields such as microfinance, human resources development and agriculture. The President highlighted areas in which Asian and Pacific

partnership could be most useful. Those areas included capacity development, trade and investment, fulfilment of long-standing international commitments, gender integration in micro, small and medium-sized enterprises.

40. The President proposed that ESCAP regional advisory services and regional subsidiary bodies give particular attention to small islands and the challenges that they faced; concrete action was needed, as was the pooling of resources.

Policy issues for the ESCAP region

Policy statement by the Executive Secretary

41. The Executive Secretary observed that, despite numerous challenges, a major earthquake in South Asia and a slowdown in the global economy, the Asian and Pacific region had achieved an average GDP growth rate of over 6 per cent in 2005 and had maintained macroeconomic stability. The Executive Secretary emphasized, however, that the region continued to face major challenges.

42. Short-term risks included still higher energy prices, the possibility of global current account imbalances unwinding suddenly, higher interest rates, disruptive exchange rate adjustments and the threat of avian influenza. Addressing such challenges would require the formulation of effective policies at the national level and enhanced cooperation at the regional level.

43. The Executive Secretary noted that it was also important not to lose sight of the longer-term challenges of poverty reduction and achieving the Millennium Development Goals, within a framework for sustainable development, which had to be the overriding priority of all Governments' policies.

44. Other challenges to be addressed included rising inequality, high levels of youth unemployment and child labour. Sustaining the current high momentum of GDP growth was important, but growth alone would not be able to solve those problems.

45. The Executive Secretary observed that long-term development required much more investment in infrastructure, such as transport, energy, water and sanitation, and ICT. In that context, the theme study for 2006 on enhancing regional cooperation in infrastructure development addressed some of those issues and pointed to the importance of regional cooperation in infrastructure development.

46. With regard to the challenge of infrastructure development, the Executive Secretary expressed the hope that the Ministerial Round Table on Enhancing Regional Cooperation in Infrastructure Development, including that Related to Disaster Management, would deliberate on ways forward for creating an intergovernmental process to review the options.

47. The Executive Secretary observed that the region's economic dynamism had also adversely affected the environment. The importance of environmental sustainability, within a viable strategy for long-term development, had been neglected by industry and the public sector, and had remained essentially unknown to the general public. Environmental policies would remain difficult to implement without creating greater public awareness and gaining public support.

48. The Executive Secretary also observed that the Asian and Pacific region had historically been a particularly disaster-prone part of the world and that natural disasters had created major challenges in the management of vital public resources such as water. The investment of resources in disaster preparedness and management was the key to reducing the human suffering that natural disasters brought in their wake. In addition, for long-term development, it was vital to have a sustainable mix of energy sources with less reliance on fossil fuels.

49. The Executive Secretary noted that the conclusion of the Sixth Ministerial Conference of the World Trade Organization, held in Hong Kong, China, in December 2005, had been disappointing in some respects. The view of the Executive Secretary was that, although the Doha Development Agenda was broadly back on track, important issues remained outstanding.

50. The Executive Secretary also noted that many countries in the region had enhanced their efforts to address emerging social issues, with a view to promoting more inclusive development and the social integration of disadvantaged and vulnerable groups. The social policy aspects of cross-border migration were matters of increasing concern in the region. Furthermore, the Executive Secretary noted with concern that the AIDS epidemic in the region had continued to spread. Those challenges were serious and the region would need to be much more actively engaged in regional and global dialogue and consultative processes so that Governments could address the issues in a meaningful manner.

51. In concluding, the Executive Secretary emphasized the importance of the year 2006 in the context of the achievement of the Millennium Development Goals. He emphasized that, in the years ahead, the people of the region would eventually pass judgement based on hard evidence concerning how much their lives had improved, and that a new sense of urgency should be given to the realization of the development goals contained in the Millennium Declaration.

Implications of recent economic and social developments

52. The Commission had before it the document entitled "Report on the current economic situation in the region and related policy issues" (E/ESCAP/1360) and

the Economic and Social Survey of Asia and the Pacific 2006 (ST/ESCAP/2396).

53. The Commission expressed appreciation of the excellent work done by the secretariat in preparing the documentation. The crucial role of the secretariat was acknowledged with regard to monitoring and analysing developments in the global economy, assessing their impact on the ESCAP region and providing essential guidance for the macroeconomic policies of member States.

54. The Commission noted that the region had continued to enjoy robust economic growth in 2005, although high and unstable oil prices, increasing current account imbalances, the slow growth of global trade and the threat of an avian influenza pandemic had adversely affected business activity. The good prospects of the Asian and Pacific region for development were cited along with the need for awareness of the challenges that the region faced. In that regard, poverty, inequality and environmental decay were major challenges for the region. The challenges of development affected, in particular, the least developed countries and Pacific island countries.

55. The Commission stated that poverty was the main obstacle to sustainable development, but noted that Governments in the region were committed to reducing poverty. In that respect, the Millennium Development Goals guided efforts to tackle major problems associated with poverty reduction and facilitated equitable and sustainable development. However, a major challenge in some countries was raising the investment rate, which was necessary for achieving higher economic growth. A number of factors discouraged such investment, including an insufficient and unreliable supply of electricity and gas, poor transport networks and inadequate telecommunication services.

56. It was recognized that achieving the Millennium Development Goals required an effective long-term strategy that included pro-poor economic growth, faster human development through education, health, nutrition and other social interventions, gender mainstreaming, social safety nets for the poor and participatory governance aimed at enhancing the voice of the poor. One delegation emphasized the importance of migration and remittances in economic development and poverty reduction, and the need to deal with the challenges and opportunities that migration presented to countries of origin, destination and transit.

57. Attention was drawn to the lack of reliable official data, which hampered the monitoring of economic, social and environmental development, especially in small island States and the least developed countries. A few Pacific island developing countries shared a specific concern about the quality of data that were used to determine their status as least developed countries. Those delegations requested the secretariat to continue to provide assistance in improving statistical capacity, data accuracy and statistical information

systems in the Pacific. One delegation requested the secretariat to provide technical assistance in conducting a cost-benefit analysis of its possible graduation from least developed country status.

58. An immediate problem that the region faced concerned issues of unemployment and underemployment. Globalization and the economic emergence of China and India had changed the economic situation and prospects of the region, while ICT had changed the speed and spread of information flows. Those developments made an impact on the competitiveness of open economies in the region. Thus, measures were needed to improve the functioning of labour markets, improve productivity and ensure that the workforce was provided with the relevant skills to succeed in today's rapidly changing global economy.

59. The Commission noted that unemployment posed a major challenge for the region, and urged the secretariat to continue its efforts in building capacity in the region to address unemployment and other emerging social issues. It noted the National Rural Employment Guarantee Scheme of India, which was designed to reduce unemployment and provide rural infrastructure.

60. It was emphasized that trade and investment and open economies were essential for ensuring economic growth and sustainable development. Support was expressed for the continuation of the secretariat's technical assistance in that area. Commitment to the multilateral trading system and to the completion of the Doha negotiations, as set out in the Ministerial Declaration adopted by the Sixth WTO Ministerial Conference, held in Hong Kong, China, from 13 to 18 December 2005, was reiterated by two delegations.

61. Many delegations requested the secretariat to accord priority to regional policy dialogues and other capacity-building programmes, in collaboration with global and regional partners, on WTO accession issues, to enable developing countries and countries with economies in transition to participate more effectively in multilateral trade negotiations.

62. Two delegations noted that more precise, effective and operational special and differential treatment constituted an integral part of the outcome of current and future multilateral trade negotiations. They underlined the importance of concepts such as special products and special safeguard mechanisms. Another two delegations noted that some developing countries had experienced market access difficulties, such as the erosion of trade preferences and restrictive rules of origin.

63. The Commission called for strong commitment by the member countries to strengthening social infrastructure as one of the pillars of development and to increasing resources for education, health and basic social services. It also called for enhanced efforts to empower vulnerable groups, including children, the elderly and persons with disabilities, and for the mainstreaming of gender considerations.

64. The Commission recognized the threat to the economies in the region posed by avian influenza and underlined the importance of preparedness and the need for urgency in that regard. It recommended the improvement of health facilities and laboratories, and capacity-building to address health-related challenges. It noted that international and regional cooperation in more rapid diagnosis, prevention and treatment was vital in decreasing the danger of pandemics.

65. Several countries had been affected by natural disasters such as the tsunami in the Indian Ocean and the earthquake in South Asia. However, strong relief measures taken by the countries concerned, aided by the international community, had gone a considerable way in relieving immediate suffering.

66. The Commission thanked the secretariat for organizing the Pacific Leaders' United Nations ESCAP Special Session (PLUS) for the first time in the history of ESCAP. It expressed its appreciation to the Government of Indonesia for hosting PLUS, which provided an opportunity for the Pacific island developing States to highlight their development needs. It welcomed the suggestion that progress in that subregion could be achieved through a strengthened Pacific-Asian partnership.

67. The wealth of experience of ESCAP in economic and social development was noted, as was the desirability of utilizing its strong capabilities in organization and coordination for pooling information and expertise, conducting policy research and promoting cooperation in diverse areas. It looked to the secretariat for further guidance and assistance in forming regional partnerships for development.

68. The Commission was informed of various trade and investment-promotion initiatives, such as the Development Initiative for Trade of Japan and the proposed Thailand-Pacific Islands Forum Plan, and various initiatives to accord duty- and quota-free market access for exports from least developed countries.

69. The delegation of Mongolia informed the Commission of the intention of its Government to host a trade ministers' conference of landlocked developing country members of WTO in Ulaanbaatar in mid-2007. Furthermore, the delegation of India informed the Commission that its Government would host the first Asia-Pacific Ministerial Conference on Human Settlements in New Delhi from 3 to 10 November 2006. Both delegations looked forward to high-level participation in the respective conferences.

70. One delegation expressed its willingness to support the establishment of an integrated trans-Asian energy system aimed at safeguarding the supply of energy resources to final consumers within the region. Another delegation reiterated its support for the cooperation between ESCAP and the Mekong River riparian countries through the Decade of Greater Mekong Subregion Development Cooperation, 2000-2009, and noted that that initiative had contributed to

strengthening relations and cooperation among the countries of the Greater Mekong Subregion.

71. The Commission expressed its appreciation of and support for the Asia-Pacific Business Forum 2006, which had been organized jointly by ESCAP, the Government of Indonesia and the Indonesian Chamber of Commerce as a side event at the sixty-second session of the Commission. It noted that the Forum was important for building and strengthening public-private partnerships. Several delegations expressed appreciation of the role of the Forum in strengthening business links and improving national and interregional regulatory oversight to secure long-term sustainable growth.

Strengthening Pacific island developing countries and territories through regional cooperation and the Pacific Leaders' United Nations ESCAP Special Session

72. The Commission had before it the document entitled "Policy issues for the ESCAP region: strengthening Pacific island developing countries and territories through regional cooperation" (E/ESCAP/1361).

73. The Pacific Leaders' United Nations ESCAP Special Session (PLUS) was a unique opportunity for Pacific voices to be raised in the annual session of the Commission. Among the participating dignitaries from the Pacific were the Presidents of the Marshall Islands and Kiribati, the Prime Minister of Tuvalu, the Vice-Presidents of the Federated States of Micronesia, and of Palau, the Deputy Prime Minister of Vanuatu, the Minister for Foreign Affairs and External Trade of Fiji, the Minister for Trade and Industry of Papua New Guinea and the Minister for Foreign Affairs of Nauru. Senior officials representing Samoa, Solomon Islands and Tonga also attended, together with other delegations.

74. The Commission expressed its appreciation to the Government of Indonesia for hosting the sixty-second session of the Commission and PLUS. It noted the call by the President of Indonesia for ESCAP and other regional bodies to focus on addressing the concerns of the Pacific small island developing States and his wish to see Indonesia share with those States experiences in such fields as microfinance, human resources development and agriculture.

75. Many delegations thanked the secretariat for organizing PLUS, the first in the history of ESCAP. Appreciation was expressed for the participation of Pacific island leaders and the cooperation of the Pacific Islands Forum Secretariat and UNDP in the organization of PLUS, which provided Pacific small island developing States with the opportunity to highlight their development needs.

76. It was noted that the objective of PLUS was to contribute to addressing the development challenges of the Pacific islands; the suggestion that that might be

achieved through enhanced and strengthened Pacific-Asian cooperation was welcomed.

77. The Commission welcomed the Pacific Plan for Strengthening Regional Cooperation and Integration, endorsed by the leaders of all the Pacific island countries at the Pacific Islands Forum meeting, held in Port Moresby in October 2005, as the basis for strengthening regional cooperation and integration. It noted that the Plan, which highlighted the importance of partnership within the Asian and Pacific region, would address many of the concerns of the Pacific island countries, such as promoting economic growth, sustainable development, good governance and security. Several members of the Commission expressed their willingness to support the implementation of the Plan.

Economic growth, employment and sustainable development

78. The overwhelming development challenges faced by Pacific small island developing States included low economic growth, rising unemployment, the increasing incidence and extent of poverty, fragile environments and limited natural resources. The physical smallness and the fragmented and isolated nature of those island countries and their extreme vulnerability to changing climate conditions were also seen as major constraints on their efforts to develop.

79. The Commission noted the success of Asian countries in achieving high and sustained economic growth in the preceding decade. Pacific small island developing States expressed admiration for that achievement and hoped that the experience of Asian countries could be shared to benefit them.

80. Many of those States were vulnerable since they were low-lying atolls or were located in cyclone-prone areas. Economic activity in those countries was affected by seasonal changes and by natural disasters. The importance of cooperation in disaster risk management to address the impact of climate change and rising sea levels in those countries was emphasized.

81. Given the small population of Pacific island countries, their human and institutional capacity needed to be strengthened so that they could address the challenges facing them. Noting the decline in some of their social indicators, the need for greater investment, especially in the areas of education and health, was recognized.

82. Fisheries were a significant resource for Pacific small island developing States, worth over \$2 billion a year, from which those countries, as the resource owners, received only between 5 and 8 per cent. The Pacific tuna stocks were the last major resource of that species remaining in the world and it was important for all stakeholders to work closely together to ensure the sustainability of the stocks.

83. The Commission noted that, given the vulnerability of Pacific small island developing States to oil shocks, closer collaboration was needed between

them and Asian countries on renewable energy development, especially solar and wave energy.

84. The Commission noted the concern expressed by Pacific small island developing States over the critical need for balanced development. In particular, it noted their concern that increasing population placed pressure on the available natural resources. Prudent management measures, both national and subregional, were essential in order to conserve the environment, preserve biodiversity and ensure sustainable development for the benefit of future generations.

Economic infrastructure and ICT

85. Regional cooperation could be an effective modality for meeting increased infrastructure requirements in transport, energy and ICST. The Commission was urged to consider implementing innovative investment incentives to channel surplus reserves from Asia into Pacific small island developing States for infrastructure development.

86. Attainment of the information society, as outlined in the Geneva Declaration of Principles and the Geneva Plan of Action of the World Summit on the Information Society, by Pacific small island developing States required assessment of their ICST policies and the possible establishment of improved satellite communication infrastructure in the framework of the Pacific Regional Digital Strategy.

Trade, investment and tourism

87. The Commission noted that the cost of doing business in Pacific small island developing States was high. Despite that, many of those countries had put in place measures to attract foreign investment into their manufacturing sector, especially in downstream processing. Political stability combined with institutional reform and good governance had contributed positively to the business environment in some countries. The importance of public-private sector partnership was also highlighted.

88. Tourism was one of the areas where Pacific small island developing States had an advantage. The attractiveness of tourism for those countries was that it was labour-intensive and could generate wider benefits in the rest of their economies. Asian investment was beginning to flow into the tourism sector in many of the countries and they looked forward to more investment and tourists from Asia.

Responses

89. Strengthened collaboration between Pacific small island developing States and their counterparts in Asia was encouraged. The important role that bodies such as development agencies, financial institutions, private-sector organizations, non-governmental organizations and donors could play in that process was noted.

90. The Commission expressed its appreciation to the Governments of Australia, China, Indonesia, Japan

and Thailand for their continuing and enhanced support, including technical assistance, to Pacific small island developing States. It noted the offer of the Government of Thailand to provide training in sustainable crop production, tourism management, community-based microfinance and income-generation for poverty alleviation, SME development and HIV/AIDS management.

91. Development partners were called upon to give greater focus to Pacific small island developing States in their cooperation programmes and to use South-South cooperation programmes in the delivery of technical and economic cooperation activities. Areas of South-South cooperation could include economic growth; employment and sustainable development; economic infrastructure, including ICT and renewable energy; and trade, investment and tourism.

92. The importance of "thinking small" in pursuing those cooperation activities, in order to be relevant to the needs of Pacific small island developing States, and the need to preserve their integrity and culture were emphasized. The Commission noted the concern expressed by those countries about ensuring genuine partnerships which benefited all.

93. Appreciation was expressed to the secretariat for promoting dialogue and partnership, and the secretariat was requested to play a leading role in coordinating technical assistance activities.

Enhancing regional cooperation in infrastructure development, including that related to disaster management

94. The Commission had before it the document entitled "Enhancing regional cooperation in infrastructure development, including that related to disaster management" (E/ESCAP/1362), which was the theme of the sixty-second session. It recognized that that theme was most relevant and timely.

95. The Commission noted that adequate infrastructure was a prerequisite for sustainable economic growth, as it provided access to global trade and investment flows and played a critical role in reducing poverty, increasing living standards and supporting the effective implementation of the Millennium Development Goals. Poor infrastructure not only hindered economic development, but also affected other areas, such as disaster recovery and social development. One delegation called for the promotion of "infrastructure for all", whereby all people including the poor would benefit.

96. The Commission noted that enhancing international and regional cooperation could be an important impetus for infrastructure development in the region. One delegation proposed the use of regional cooperation platforms to discuss and review policy options and promote successful models for the planning, development and management of infrastructure. In that context, it suggested that developing countries could

benefit from the experiences of developed countries. It also encouraged the secretariat to carry out more policy research and promote practical cooperation for progress in infrastructure.

97. The Commission noted that regional cooperation in infrastructure development must have the aims of economic progress and poverty reduction, based on the principles of sustainable development.

98. The importance of the secretariat's work in creating a seamless intermodal transport network equipped with state-of-the-art information and communication technologies was reiterated. The secretariat's work on the Asian Highway and Trans-Asian Railway, as well as cross-border and transit facilitation, was commended. The Commission noted that the secretariat needed to promote the interoperability, interconnectivity and intermodality of transport infrastructure, including that related to archipelagic countries.

99. One delegation expressed the view that cross-border infrastructure development had huge potential benefits for the Asian and Pacific region. Two delegations held the view that development assistance provided by member States to facilitate regional cooperation for economic and social development should include infrastructure development.

100. Many delegations recognized that the public sector played a key role in formulating and enforcing policies and laws, while the private sector had experience in market operation, as well as rich expertise and professionals who were eager to be involved in infrastructure development.

101. A number of delegations indicated their role in providing access to and transit through neighbouring countries, underscoring the possibility of turning the disadvantage of being landlocked into the advantage of being land-linked hubs. The Commission noted that one landlocked country was striving to achieve that through cooperation with neighbouring countries in the development of transport infrastructure. That could create east-west and north-south routes for regional trade and economic corridors.

102. The Commission noted that, although countries were incorporating ICST into national development plans, the digital divide continued to widen. Urgent attention needed to be given to the significant gaps that remained between countries and within countries in terms of access to, and use of, such technologies. To carry out practical cooperation for greater hardware interconnectivity and better supportive software for business operation, management and streamlined customs procedures, the secretariat was requested to establish an intraregional network to achieve economies of scale.

103. The Commission requested that the secretariat strengthen national capacity in ICST, including the development of human resources. In that respect, it noted the announcement of the Republic of Korea that

the Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) would be fully operational in June 2006. It also noted with appreciation the technical cooperation activities of India in Pacific island countries for the development of ICT, in partnership with the Pacific Islands Forum Secretariat.

104. The Commission recognized that the region was prone to natural disasters, resulting in extensive damage to property and loss of life, and agreed that establishment of the relevant disaster management infrastructure was a major and urgent requirement towards achieving the Millennium Development Goals. It noted that disasters were often cross-boundary in nature and that most countries in the region lacked the necessary technical and financial capability to develop infrastructure for disaster preparedness. The importance of early warning, emergency rescue, recovery and relief operations was stressed.

105. The Commission emphasized that national efforts therefore needed to be supported by regional cooperation, with ESCAP playing a catalytic and coordinating role in the development of regional cooperation mechanisms to respond effectively to major disasters.

106. The Commission noted the particular concern of the Pacific island developing countries over rising sea levels, caused by climate change. One delegation encouraged greater cooperation in exploring measures for economic growth that would not compromise environmental sustainability.

107. The Commission noted that the geographical isolation of island developing countries intensified their need to have in place adequate and appropriate transport, information and communications systems to enable them to realize significant progress in development.

108. The Commission noted with appreciation the contribution of \$10 million from Thailand as seed money towards the establishment of the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia, administered by ESCAP, and encouraged other member States to make contributions. The Commission noted that the international community had reacted to major disasters quickly with the aim of assisting the victims, but it recognized that such responses had to be coordinated to ensure effectiveness.

109. The Commission noted the offers of Japan and the Republic of Korea to share their experience and expertise in disaster preparedness, recovery and management. The Commission also noted a proposal by the Islamic Republic of Iran to provide \$10 million within five years for the establishment and operation of an Asian and Pacific ICST-enabled disaster management centre, affiliated with ESCAP. The same delegation requested the secretariat to conduct a study on the proposed centre.

110. One delegation observed that there were many initiatives and regional centres dealing with the prevention and management of natural disasters. One delegation requested that the secretariat conduct a study to identify the requirements of the region and streamline those activities. Another delegation noted the efforts made towards natural disaster management and expressed the view that such efforts were most efficient and effective when administered by and through existing institutions.

111. Noting the growing water scarcity in Asia and the Pacific, the Commission underlined the important work of the secretariat in strengthening regional and subregional cooperation to develop infrastructure for water resources management and conservation. It stressed that it was important for the secretariat to continue to promote efficiency in water use and water services, and improvements in water productivity and conservation through public-private partnerships.

112. The Commission noted that the development of water-related infrastructure aimed at improving access to safe drinking water and sanitation constituted a basis for sustainable development and the achievement of the Millennium Development Goals. The important role of the secretariat in promoting water-related infrastructure in transboundary river basins was highlighted.

113. The Commission noted the importance of energy infrastructure development as a basis for sustainable development and the achievement of the Millennium Development Goals. In that context, one delegation underscored the need to pursue infrastructure development policies in an environmentally sustainable manner.

114. The Commission expressed its concern over the recent increases in oil prices and noted the need to promote regional cooperation in infrastructure development to enhance energy security. It noted a proposal to develop a regional mechanism for cooperation to improve planning and coordination, which could lead to an integrated trans-Asian energy system, aimed at safeguarding the supply of energy to final consumption destinations within the region.

115. The Commission also recognized the role that ESCAP could play in the promotion of regional cooperation and exchanging experiences to promote energy cooperation with private sector participation in order to enhance energy security. One delegation requested that the secretariat take the necessary measures, including preliminary studies, with a view to facilitating the formation of such a system.

116. The Commission noted that financing was a critical component of infrastructure development and that the secretariat estimated the annual financial gap to be at least \$180 billion. It also noted that, because financing of infrastructure development was beyond the capacity of most national economies, it was necessary to seek innovative financial instruments and institutional arrangements.

117. The need to explore regional financial support mechanisms to accelerate the development of regional infrastructure projects was noted. In that regard, the secretariat was requested to conduct a study that would cover all practical options through which regional cooperation could help to invest surplus savings in the region for infrastructure development. Such options could include an expansion of the mandate and scope of the Asian Bond Fund in favour of infrastructure investment.

118. The Commission acknowledged the contributions of development partners and multilateral agencies, such as the World Bank, IMF and ADB. However, one delegation mentioned that it was time to start a discussion on the structure that needed in order to be established in order to bridge the gap between investment needs and actual flows.

119. It was noted that Asia accounted for 70 per cent of global foreign exchange reserves, which far exceeded what was required in order to pay creditors and dispel currency speculation. Attention was drawn to the opportunity cost of holding reserves when there was ample scope for domestic investment in sectors such as infrastructure in the region. In that regard, the Commission noted that India had commissioned a study to examine all possible options for financing infrastructure, including the strengthening of existing institutions.

120. The Commission observed that innovative approaches to infrastructure development had to be formulated, with a view to encouraging private investment in that area. In that regard, the Commission heard a view that the creation of a specific financial institution, such as an Asian investment bank that focused on infrastructure development, would help to promote investment from the private sector in infrastructure, which had long been regarded as a State or public area of investment. The Commission also noted the view that a cautious approach should be taken to the idea of establishing a new institution, such as an Asian investment bank, as it duplicated the activities of existing institutions, such as the Asian Development Bank.

121. The Commission noted the proposal by several delegations to establish an intergovernmental task force drawn from States members of ESCAP to examine ways and means of increasing the capacity of the region for timely and increased funding to meet its infrastructure needs. Some delegations, however, held the view that the establishment of such a task force would be premature. In the area of financial resources, ADB had played a substantial role and the suggestion was made that the existing institutions be strengthened.

122. The Commission noted that infrastructure problems went beyond mere funding. It was equally important to make the right policies and create an enabling environment for financial markets to invest in infrastructure effectively, and to ensure that regulatory

frameworks did not impede market signals. It noted that good governance was the key to creating a conducive environment for infrastructure development. That included transparent legal frameworks, the establishment and use of appropriate systems of public procurement, based on transparency and competition, objective and predetermined criteria in decision-making, and the adoption of measures that were effective in preventing corruption.

123. The Commission adopted resolution 62/2 on the Jakarta Declaration on Enhancing Regional Cooperation in Infrastructure Development, including that Related to Disaster Management.

Implementation of the Jakarta Declaration on Millennium Development Goals in Asia and the Pacific: the Way Forward 2015

124. The Commission had before it the document entitled "Implementation of the Jakarta Declaration on Millennium Development Goals in Asia and the Pacific: the Way Forward 2015" (E/ESCAP/1363).

125. The introductory statement of the Chairperson highlighted the key commitments and recommendations contained in the Jakarta Declaration and emphasized the need for the developed countries to fulfil their obligations to establish a genuine and mutually beneficial partnership for development. The Chairperson emphasized that the challenge for member countries lay in their moving forward to translate the commitments into concrete and viable action to fulfil the Millennium Development Goals. In that regard, the need for a road map to provide members and associate members with guidelines on key actions and modalities to address gaps in meeting their targets under the Goals by the year 2015 was underscored. Such a road map would include provisions for the mobilization of resources for effective implementation of the Goals, and mechanisms by which the secretariat would undertake periodic reviews of the progress towards achieving the Goals. The importance of the active participation of all stakeholders in the region to generate a strong sense of ownership of the Goals was also emphasized.

126. The introductory statement of the Executive Secretary referred to the request contained in the Jakarta Declaration for the Commission to include an item in the provisional agenda of its sixty-second session on the modalities for regional implementation of the Declaration, including the formulation of a plan of action which would serve as a road map to move forward to 2015. The proposals in the note by the secretariat were intended to provide a basis for deliberations by the Commission on that subject.

127. The Commission expressed appreciation to the Government of Indonesia for having hosted in August 2005 the Regional Ministerial Meeting on the Millennium Development Goals in Asia and the Pacific: the Way Forward 2015, and for its role in promoting high-level engagement among Governments and other

stakeholders in support of the implementation of the Goals.

128. The Commission noted the strong political commitment of Governments to the Millennium Development Goals and, in that regard, recognized the importance of the Jakarta Declaration in furthering national and regional efforts towards the achievement of the Goals. One delegation emphasized the need to formulate a road map with a workable set of guidelines to implement the Jakarta Declaration. The need to commit adequate resources, ensure the participation of all stakeholders and undertake periodic regional reviews of the implementation of the Jakarta Declaration was also emphasized.

129. The Commission noted the efforts of some Governments to integrate the Millennium Development Goals into their national development strategies and their adoption of poverty reduction as an overarching national development policy. One delegation emphasized the importance of giving priority to poverty reduction in national development plans and of assessing the cost of achieving the Goals as the basis for a financing plan. Another delegation reported that its Government had set poverty reduction targets that were more ambitious than the Goals. One delegation reported that its Government had started formulating a Goal-based national development strategy and established working groups to conduct needs assessments for individual Goals. The same delegation noted that progress had been made so far in some Goals concerning education, gender and reducing child and maternal mortality. However, there were enormous obstacles in reducing poverty by half and ensuring environmental sustainability by 2015.

130. Some delegations noted the considerable challenges facing the region in sustaining the progress made thus far, particularly in addressing inequalities in the distribution of income, the pockets of extreme poverty within countries and the sheer number of poor people in the region (two thirds of the world's poor). One delegation expressed concern over the slow progress in some areas of the Millennium Development Goals and the need to take urgent action to promote sustainable development. The Commission stressed that those challenges must be addressed and tackled through cooperation and partnership among countries, as highlighted in the Jakarta Declaration.

131. It was proposed by one delegation that partnership and cooperation be focused on four areas: (a) enhancing efforts to create multilateral and regional trading systems that were transparent, rule-based, predictable as well as non-discriminatory in accordance with Millennium Development Goal 8; (b) strengthening international cooperation to identify and develop additional and innovative sources of financing for development on a public, private, domestic or external basis, in order to increase and supplement traditional sources of financing, including debt-for-MDGs swaps, public-private partnerships and microfinancing; (c) fulfilling the commitments made by

the developed countries to allocate 0.7 per cent of GNP for ODA; and (d) enhancing regional cooperation to achieve greater aid effectiveness by exchanging information on good practices in order to better align development assistance with national development plans and to harmonize development assistance to achieve optimum results in accordance with the Paris Declaration on Aid Effectiveness: Ownership, Harmonization, Alignment, Results and Mutual Accountability.

132. The Commission underscored the need for developed countries to fulfil their ODA commitments. In that context, the delegation of Japan drew the attention of the Commission to the commitment made by its Government at the 2005 World Summit to increase its ODA by \$10 billion over the next five years and the importance it placed on the improvement of health as a key component of development. In that context, the Government of Japan was taking the lead in addressing infectious diseases at the regional level with its hosting of the G-8 Kyushu-Okinawa Summit in July 2000, its contribution of \$350 million to the Global Fund to Fight AIDS, Tuberculosis and Malaria and its pledge made in March 2006 of another \$500 million.

133. The delegation of the United Kingdom of Great Britain and Northern Ireland announced that the United Kingdom Department for International Development would increase its bilateral programme for Asia by approximately 25 per cent from 2004 to 2008 and that that trend was expected to continue thereafter as the country moved towards the target of 0.7 per cent of gross national income by 2013.

134. One delegation, while recognizing the importance of enhanced financial resources for development, stressed that the Millennium Development Goals could not be realized only through aid. Other factors, such as trade, infrastructure development, capacity-building and the transfer of appropriate technology to developing countries, were also necessary to achieve the Goals. In that context, the delegation underscored the need to integrate development aid with the national development strategies of recipient countries, promote good governance and combat corruption. The delegation also emphasized the need for institutional reforms, not only in developing countries but also in the international economic and monetary institutions. Reforms in debt relief, success of the Doha round and good governance, not only at the domestic level but also in the international framework, were emphasized as crucial elements in achieving the Goals.

135. The Commission stressed the importance of sustained economic growth for poverty reduction and the achievement of the Millennium Development Goals. It also emphasized that the pursuit of economic growth needed to be coupled with socially oriented government interventions in order to improve the lives of the poor and reduce income disparity between urban and rural areas, as well as between and within ethnic groups.

136. The Commission noted the importance of trade as a key element for economic growth. In that regard, it emphasized enhancing market access for developing country exports, liberalizing the service sector, facilitating regional trade that would benefit the region, strengthening supply-side economies, developing infrastructure in support of export-oriented policies and addressing the growing trend towards protectionism in some developed countries. One delegation pointed out the need for duty-free and quota-free market access by developing countries to developed country markets as an important measure to support the achievement of the Millennium Development Goals.

137. Another delegation stressed the importance of agriculture to the developing countries. In that regard, trade negotiations should take into account the food and livelihood security of the large number of marginal subsistence farmers and the need for developed countries to remove trade-distorting subsidies in agriculture. Another delegation emphasized the need to strengthen domestic economies, particularly by supporting micro, small and medium-sized enterprises and promoting microfinance.

138. One delegation pointed out that section III (A), on action at the international level, proposed in the note by the secretariat (E/ESCAP/1363), went beyond the mandate of paragraph 43 of the Jakarta Declaration, which called for the Commission at the current session to consider an action plan for regional implementation of the Declaration.

139. With respect to a possible Asia-Pacific convention on the elimination of corruption, mentioned in paragraph 38 in section III (B), on action at the regional level, the same delegation cautioned that any new convention should be complementary to, and not a replacement of, the United Nations Convention against Corruption. Further, the important role of the Economic Cooperation Organization in promoting regional cooperation was pointed out. With regard to the proposal for regional monetary cooperation in the note by the secretariat, it was also pointed out in the discussion that the Islamic Development Bank could play a role in that area.

140. One delegation suggested revising the first sentence of paragraph 30 of the note by the secretariat to "There is a need to consider additional measures aimed at ensuring long-term debt sustainability" in accordance with paragraph 26 (c) of the 2005 World Summit Outcome document. In addition, in the second sentence of the same paragraph, the delegation suggested adding the phrase "where appropriate, and on a case-by-case basis", before the words "to consider", for the same reason as that mentioned above.

141. The Commission expressed appreciation to the secretariat for its support to members and associate members in fulfilling their Millennium Development Goal commitments. It stressed the need for the secretariat to undertake periodic analysis and review of

regional progress towards achieving the Goals, statistical capacity-building for improving the quality of data for monitoring progress towards achieving the Goals, policy dialogue and the exchange of good practices. One delegation requested that the secretariat consider innovative schemes for achieving the Goals, particularly the utilization of debt-for-equity swaps in order to generate resources for development in the poorest areas. Another delegation suggested that the secretariat could initiate quick-win initiatives, as articulated in the 2005 World Summit Outcome document.

142. The representative of UNDP reported on the tripartite partnership between UNDP, ESCAP and ADB in providing a unique platform to support the member countries in the achievement of the Millennium Development Goals and in producing regional reports that provided the basis for developing policies and identifying actions required for the region to meet the Goals. The representative announced a demand-driven regional programme recently developed by UNDP to support national strategies and plans based on the Goals. The representative also reported that pilot work had commenced in four countries in 2006 and six more countries would be supported in 2007.

143. In view of the priority accorded by Governments to achieving the Millennium Development Goals in Asia and the Pacific, the delegation of Japan informed the Commission that its Government had submitted a draft resolution entitled "Implementation of the Millennium Development Goals in Asia and the Pacific" for adoption at the current session and expressed the hope that the resolution would receive support from other delegations.

144. The Commission adopted resolution 62/1 on achieving the Millennium Development Goals in the ESCAP region.

Key developments and activities at the regional level

Poverty reduction

Key issues relating to poverty reduction

145. The Commission had before it the documents entitled "Report of the Committee on Poverty Reduction on its second session" (E/ESCAP/1364), "Summary of progress in the implementation of resolutions relating to the theme of poverty reduction" (E/ESCAP/1364/Add.1) and "Confronting poverty in Asia and the Pacific" (E/ESCAP/1365 and Corr.1). It expressed appreciation to the secretariat for the very informative and valuable documentation.

146. The Commission noted that two thirds of the world's poor lived in the Asian and Pacific region, which heightened the importance for the region of poverty reduction and of achieving the Millennium Development Goals. It acknowledged that, while many

countries in the region were experiencing rapid economic growth, there was also evidence of growing disparities between countries in the region, between rural and urban areas within countries and between different population groups. Delegations also drew the attention of the Commission to the fact that economic growth and development often did not reach remote parts of a country, such as small islands and border areas.

147. The Commission recognized that economic growth was essential for poverty reduction, but that pro-poor economic growth with distribution policies and targeted programmes was required to ensure that the benefits of economic growth reached all population groups. Several delegations recounted their experiences with programmes that targeted populations in remote areas and small islands, as well as ethnic minorities. It was observed that it was necessary to bring essential services, such as health care and education, water supply and roads, to the rural areas and to ensure that the rural population had access to those services, if necessary through subsidies.

148. The Commission recognized that the public sector alone could not meet the enormous demand for services and that poverty reduction required partnerships between the public sector and the private sector, between both those sectors and communities of the poor and between the public sector and civil society. Examples mentioned included public-private partnerships in the extension of credit for the poor and in the delivery of health care and education.

149. A number of delegations noted the strong potential linkages between growth in the agricultural sector and poverty reduction in the rural areas. The impact depended, however, on the extent to which government, donors, civil society and other key stakeholders were able to collaborate to target support better for small farmers. In that respect, important issues for small farmers included securing land tenure and gaining access to natural resources, effective water management, removing barriers to efficient marketing, and the availability of affordable credit.

150. The Commission noted the social problems that were created by disparities between urban and rural areas and between different parts of a country. Because of the many opportunities in urban areas, people with better education in the rural areas moved to the city, leaving behind older people and people with less education. Consequently, urban areas were developing, while some rural areas were decaying. The Commission also observed a process of feminization of agriculture, whereby the role of women in agriculture increased as men moved to the urban areas.

151. One delegation mentioned the close link between poverty and vulnerability, and informed the Commission that, as the population of its country was dispersed over numerous islands, it was extremely vulnerable to natural disasters such as tsunamis. Protecting the dispersed population and providing

access to essential services posed serious difficulties to the Government. The delegation informed the Commission that its country had embarked on a programme of consolidation of the population in larger centres in order to provide better protection to the population.

152. One delegation emphasized the concept of human security along with the notion of poverty reduction through economic growth and the importance of ownership and partnership.

153. In that regard, one delegation stated that there was as yet no internationally agreed definition of the concept of human security.

154. While sharing experiences on poverty reduction, one delegation noted the difficulties of reducing poverty in a situation of conflict. It observed that conflicts resulted in infrastructure losses, restricted expenditure on development by the Government, obstructed the work of international organizations and non-governmental organizations, and discouraged the private investments necessary for economic growth. Conflicts also weakened service delivery at the grass-roots level, which was essential for poverty reduction, and affected production, trade and transactions. The delegation requested that the secretariat explore and study the links between poverty reduction and tourism, and poverty reduction and conflict.

155. One delegation observed that poverty was not only a problem of low income, but also of high expenses. It informed the Commission about a good practice involving mutual learning by villagers to reduce unnecessary expenses and enabling household and community savings to be made. In that respect, the concept of the sufficiency economy proposed by His Majesty the King of Thailand was explained.

156. Several delegations noted the crucial role of infrastructure in enhancing economic growth, particularly that resulting from trade and development. Given the strong linkages between economic growth and poverty reduction, they recognized the importance of developing road, water supply and ICT infrastructure. With regard to the financing of infrastructure development, it was noted that the improvement in the investment climate played a critical role in facilitating public and private infrastructure projects. Such infrastructure facilitated economic growth and poverty reduction, enabling the region to achieve the Millennium Development Goals.

157. The Commission agreed that decentralization was an important tool for poverty reduction, as Governments were unable to respond to all the needs of all the people. It noted that problems differed from one region to another within a country and that decentralization facilitated the development of different solutions to address the specific problems of the different regions within a country. It was acknowledged, however, that decentralization needed to be accompanied by development of the capacity of local officials.

158. Several delegations noted that community-based development was essential to reduce poverty. Through a community-based approach, people were enabled to take charge of their own lives, their communities and their future, and to monitor the impact of poverty reduction programmes. Through participatory planning of rural development, the rural population was able to identify its most urgent needs and problems, and to formulate appropriate plans to address them. It required government support, however, for the implementation of its plans in the form of financial assistance and capacity development. The delegations called on the secretariat to conduct more studies on community-based development, urban management and participatory development planning.

159. One delegation observed that community-based approaches to environmental protection increased the sense of ownership by communities of natural resources and ensured their cautious and sustainable use. Community-based development in rural areas also created economic and social opportunities for the rural poor and reduced their need to seek new opportunities in urban areas, thereby limiting the need for rural-urban migration.

160. One delegation noted the importance of the development of secondary crops for poverty reduction. It commended the ESCAP Centre for Alleviation of Poverty through Secondary Crops Development in Asia and the Pacific (CAPSA) for its work, in particular the information on secondary crops which it generated. With the aim of enhancing the Centre's regional impact, one delegation invited ESCAP member States to start contributing, or to increase contributions, to the Centre and urged CAPSA to share success stories with member States.

161. The Commission acknowledged the importance of micro, small and medium-sized enterprises and the extension of microfinance as instruments for poverty reduction. It also highlighted the importance of good governance, transparency and accountability in rural development. Financial management for development at the village level needed to be transparent, so that all could see how public and community funds were being used.

162. One delegation cited the conclusion of the Expert Group Meeting on Rural Development and Rural Poverty Reduction, which had been held in Bangkok in May 2005, that past rural development programmes had often been ineffective because the officials carrying out those programmes did not recognize sufficiently the importance of good governance and inclusiveness. It stressed that a rights-based approach to development was critical for poverty reduction.

163. One delegation stressed the positive impact of ICT on rural poverty reduction, as it empowered citizens by providing access to information and knowledge. It noted that ICT enabled the rural population to avoid middlemen, who often sought disproportionate profits by virtue of their access to

information on prevailing prices in various markets. ICT increased the bargaining power of farmers and could help tackle corruption at the grass-roots level. The Commission was informed of good practices in the use of ICT for rural poverty reduction, such as e-villages.

164. The Commission recognized that poverty was a multifaceted phenomenon and that a proper understanding and an effective reduction of poverty required data and information, in various formats, from a number of government agencies and other stakeholders. It recognized the importance of reliable and timely statistics for creating targeted, cost-effective and coherent poverty reduction policies.

165. Several delegations noted with appreciation the capacity-building support that the secretariat had provided for the development of official statistics in general and poverty measurement in particular. They requested the secretariat to continue facilitating the exchange of best practices in the collection, compilation, dissemination and analysis of poverty statistics and other statistics needed for monitoring the internationally agreed development goals, including the Millennium Development Goals.

166. One delegation noted that it was not unusual for agencies of the same Government to provide contradictory data on the same phenomenon, and made the suggestion that the secretariat develop a project to study and make recommendations on an integrated data-collection model for national poverty statistics. Such a project could facilitate better cooperation among government agencies in collecting, sharing and using poverty-related data.

167. The Commission called on the secretariat to establish dialogue between member States in order for them to exchange experiences in poverty reduction, to continue to implement demonstration projects and to organize platforms for the sharing of knowledge, experiences and good practices in poverty reduction and public-private partnerships. The Commission noted the offer by several delegations to share their experiences on poverty reduction with other ESCAP members.

168. The Commission adopted resolution 62/10 on strengthening statistical capacity in Asia and the Pacific.

169. Given the impact of natural disasters on poverty reduction, one delegation requested the secretariat to pay further attention, and give priority, to regional measures on managing natural disasters. Another delegation urged the secretariat to study the opportunities for debt-for-equity swaps that helped countries to reduce poverty.

170. The Commission observed that the region had a substantial number of people living on less than \$1 a day. As ESCAP was the only regional forum covering the entire region, it urged that the secretariat continue to tackle poverty reduction issues in cooperation with member countries and other international organizations. In that respect, it called on the secretariat to formulate a

road map to achieve the Millennium Development Goals in Asia and the Pacific. The Commission reiterated that the Millennium Development Goals were a compact and integrated set of intrinsically related and linked goals, with targets within each goal; if the region was to achieve the Millennium Development Goals, no goals could be excluded.

Managing globalization

171. The Commission had before it documents E/ESCAP/1366, E/ESCAP/1367 and Corr.1 and E/ESCAP/1368-1371, covering the work of four subprogrammes in the area of managing globalization, namely, International trade and investment, Transport infrastructure and facilitation and tourism, Environment and sustainable development and Information, communication and space technology. It commended the secretariat on the quality of the documents.

172. The Commission generally supported the report of the Committee on Managing Globalization on its second session (E/ESCAP/1366), including strategies for the two parts of that Committee, namely, Part I: International trade and investment, and transport infrastructure and facilitation and tourism, and Part II: Information, communications and space technology, and environment and sustainable development. However, in view of the convening of the Ministerial Conference on Transport in November 2006 and the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific in February 2007, one delegation suggested that Part I of the Committee on Managing Globalization should focus more on trade and investment, while Part II should focus more on environment and sustainable development.

Trade and investment

173. The Commission noted that trade and investment were important sources of financing for development. It also noted that, for trade to be an effective engine of growth and development, an open, non-discriminatory, rules-based, universal and equitable multilateral trading system had a crucial role to play.

174. The Commission drew attention to the progress achieved in the Doha-mandated negotiations as embodied in the Ministerial Declaration adopted at the Sixth WTO Ministerial Conference, held in Hong Kong, China, from 13 to 18 December 2005, while also noting that numerous challenges lay ahead and intensive efforts would be needed to meet the deadlines contained in the Ministerial Declaration.

175. A number of delegations observed that a development outcome of the negotiations was linked largely to improved market access for export products of interest to developing countries, through the reduction or elimination of trade protectionism, particularly with regard to trade-distorting subsidies, high tariffs, tariff escalation, tariff peaks and non-tariff barriers, and to providing enhanced opportunities for the

temporary movement of natural persons. It was also observed that, because a large proportion of the population in the region depended on subsistence agriculture, addressing food and livelihood security concerns was an important aspect of the development dimension of the Doha negotiations.

176. The Commission commended the secretariat on the usefulness of the WTO/ESCAP technical assistance programme. It requested the secretariat to continue to accord high priority to the implementation of that programme.

177. The Commission noted that many ESCAP members and associate members were not yet members of WTO and requested the secretariat to continue to assist those countries seeking accession to WTO for equally applicable accession.

178. The Commission noted that a balanced outcome of the trade facilitation negotiations could lead to a substantial reduction in trade transaction costs and improve overall trade competitiveness, thus leading to "win-win" results for development and the global trading system as a whole. Several delegations raised the issue of supply-side constraints and requested that the secretariat continue its regional technical cooperation programmes for improving the implementation of trade facilitation measures and strengthening of SMEs and e-commerce to enhance trade efficiency and competitiveness.

179. The Commission took note of the intention of Mongolia to host a conference of trade ministers of WTO members and landlocked developing countries in Ulaanbaatar in 2007 and its request for support in preparation for the conference.

180. The Commission underscored the importance of strengthening capacity in trade policy analysis and research. It also expressed appreciation of the ongoing work of the Asia-Pacific Research and Training Network on Trade (ARTNeT), noting its contribution to policy-related decision-making and promoting regional cooperation in trade research analysis and information sharing. In that regard, the complementarities between ARTNeT and the WTO/ESCAP technical assistance programme were underlined and the secretariat was requested to continue to strengthen those mutually beneficial linkages.

181. The Commission noted that regional and bilateral trade agreements could be an effective means of promoting trade and investment flows, both regionally and globally. In that context, it supported the secretariat's analytical work, including the regional trade agreement/bilateral trade agreement database it had set up, and its efforts to build on common principles, so that such agreements could become building blocks of the multilateral trading system.

182. The Commission observed that ministers of participating States of the Asia-Pacific Trade Agreement (APTA) had signed the amended text and expressed appreciation to the secretariat for providing

secretariat services for the Agreement. One delegation noted that the Agreement had the potential to evolve into a mechanism for promoting greater regional cooperation and solidarity. In that context, timely implementation of the commitments, and assessment of the benefits emanating therefrom, were necessary.

183. A number of delegations also observed that, in order to fulfil the potential of APTA, it was necessary to deepen liberalization and widen coverage in accordance with the relevant provisions contained in the Agreement. The secretariat was requested, upon entry into force of the Agreement, to promote awareness of the Agreement, undertake an analysis and promote the exchange of information on the exports and imports being traded under APTA and engage the private sector to a greater degree. The expansion of membership in APTA was supported in conformity with the principles of transparency, national treatment and most-favoured-nation status enshrined in the Agreement.

184. Several delegations noted that, in order to utilize enhanced market access opportunities, developing countries, particularly the least developed countries, landlocked and transit developing countries and small island developing countries, needed to build up production capacity in order to supply markets. The Commission welcomed and emphasized the outcomes achieved in cooperation on trade and investment facilitation in the Greater Mekong Subregion. One delegation expressed appreciation of the secretariat's efforts to establish supply chains in the Subregion. A number of delegations suggested that the secretariat continue to implement that work, including trade and investment facilitation, entrepreneurship development, promotion and facilitation of FDI, improvement of the investment climate and brand diversification.

185. The Commission adopted resolution 62/6 on managing globalization through strengthened regional cooperation in trade and investment.

186. One delegation recognized the important role of science and technology in enterprise development and requested that the secretariat implement programmes aimed at promoting innovation in SMEs. It also requested the secretariat to undertake, in collaboration with the World Intellectual Property Organization and other international organizations, studies on trade-related aspects of intellectual property rights and the benefits and costs to SMEs participating in global supply chains.

Transport infrastructure and facilitation and tourism

187. The Commission recognized that, in order to accelerate economic growth, trade and FDI, the development of good quality infrastructure was a necessity.

188. The Commission noted the progress in infrastructure development reported by a number of countries, including Cambodia, India, Indonesia, the

Islamic Republic of Iran, Kazakhstan and the Russian Federation.

189. The Commission expressed its support for the development of the Asian Highway and Trans-Asian Railway networks, as well as Euro-Asian transport corridors. It noted that both networks would become the basic building blocks for the development of an international integrated intermodal transport network for the region.

190. The Commission urged that the secretariat continue its work to promote the development of intermodal transport infrastructure, particularly to meet the special needs of subregions and of landlocked and transit developing countries. A number of delegations requested that the special needs of archipelagic and island countries be included in those activities. The Commission requested that the secretariat continue providing assistance to member countries, with regard to financing the Asian Highway infrastructure, and extend its work to other infrastructure sectors.

191. The Commission noted with satisfaction the entry into force of the Intergovernmental Agreement on the Asian Highway Network in July 2005, which clearly demonstrated a high level of regional cooperation. It also noted the recent ratification of the Agreement by India and Thailand. The Commission expressed appreciation of the support provided by the Government of Japan for the secretariat's work in relation to the Asian Highway network.

192. The Commission noted with satisfaction that the Intergovernmental Agreement on the Trans-Asian Railway Network had been finalized at an intergovernmental meeting held in Bangkok in November 2005. It also noted that some countries had requested minor corrections with respect to the names of stations on existing routes listed in annex 1 to the Agreement.

193. The Commission adopted resolution 62/4 on the Intergovernmental Agreement on the Trans-Asian Railway Network.

194. The Commission welcomed the offer of the Government of the Republic of Korea to host the Ministerial Conference on Transport in Busan from 6 to 11 November 2006. The Conference would include a signing ceremony for the Intergovernmental Agreement on the Trans-Asian Railway Network. The Commission also supported the draft agenda for the Ministerial Conference.

195. The Commission expressed its full support for the Intergovernmental Agreement on the Asian Highway Network and the Intergovernmental Agreement on the Trans-Asian Railway Network and emphasized their role in facilitating cooperation between countries and promoting the coordinated development of infrastructure across the region as a tool to enhance economic integration through trade and tourism. It also recognized their role in assisting

member countries in achieving the Millennium Development Goals.

196. Some delegations drew attention to the successful implementation of demonstration runs of container block-trains along the northern corridor of the Trans-Asian Railway network. They welcomed the announcement by the Democratic People's Republic of Korea that it would participate in future demonstration runs after the line between its north-eastern town of Rajin and Tumangang had been upgraded in accordance with the cooperation agreement between the Democratic People's Republic of Korea and the Russian Federation concluded in Vladivostok, Russian Federation, in March 2006.

197. The Commission noted with satisfaction the secretariat's study on an integrated international transport and logistics system for North-East Asia and requested that the secretariat expand its work in that area.

198. The Commission also noted with satisfaction the progress made in promoting transport facilitation. It requested that the secretariat continue to cooperate with the Economic Commission for Europe, ADB and the Shanghai Cooperation Organization in that area and provide assistance in acceding to international conventions on transport facilitation.

199. In view of the shortfall in the financing available for infrastructure, the Commission recognized that innovative ways of mobilizing finance for infrastructure investment needed to be identified. Furthermore, it noted the initiatives of India in establishing the Infrastructure Development Finance Corporation Limited and of Indonesia in setting up the Pro-Poor Public-Private Partnership Resource and Training Centre. In that respect, several delegations requested that the secretariat initiate capacity-building and technical cooperation activities for its members in the implementation of infrastructure projects.

200. The Commission welcomed the outcome of the High-level Intergovernmental Meeting on Sustainable Tourism Development, held in Bali, Indonesia, from 7 to 9 December 2005, and Phase II (2006-2012) of the Plan of Action for Sustainable Tourism Development in the Asian and Pacific Region, annexed to document E/ESCAP/1369.

201. The Commission also endorsed the proposal for a regional study on the role of tourism in socio-economic development to be prepared by the secretariat for submission to the Commission at its sixty-third session, in 2007. One delegation requested that the role of rural tourism be included in the study.

202. The Commission reiterated the importance of capacity-building, in both the public and private sectors, as contained in Phase II of the Plan of Action. One delegation proposed that cultural tourism be promoted as a means of fostering multicultural learning.

203. The Commission adopted resolution 62/3 on the implementation of the Plan of Action for Sustainable

Tourism Development in Asia and the Pacific, Phase II (2006-2012) and the Regional Action Programme for Sustainable Tourism Development.

Environment and sustainable development

204. The Commission noted with appreciation the activities carried out by the secretariat relating to environment and sustainable development, especially their importance for the implementation of the recommendations of the Johannesburg Plan of Implementation of the World Summit on Sustainable Development and for achieving the Millennium Development Goals.

205. Some delegations observed that the rapid economic growth in the region was increasing the pressure on the carrying capacity of the environment in Asia and the Pacific. Harnessing the positive dynamics of economic growth while ensuring improvement of environmental sustainability required close collaboration among government, private sector and civil society actors.

206. The Commission commended the activities undertaken to promote "green growth" and recommended the continuation of such activities, especially technical assistance for capacity-building, and enhanced regional and subregional cooperation.

207. The Commission underscored the need for sustainable and eco-efficient natural resources management, which required a fundamental review of lifestyles, and recommended the promotion of initiatives such as the "3 Rs", Reduce, Reuse and Recycle.

208. One delegation drew the attention of the Commission to the suggestion that a mechanism be established to assist micro, small and medium-sized enterprises in promoting the principles of efficient use of raw materials and energy efficiency, which could also be followed in agricultural practices and household activities.

209. Another delegation supported the establishment of a regional "help desk" on sustainable consumption and production.

210. The Commission noted the activities that had been undertaken in the framework of the International Decade for Action, "Water for Life", 2005-2015, and in preparation for the Fourth World Water Forum, held in Mexico City in March 2006. It acknowledged the need for promoting sustainable water resources management and "Local actions for a global challenge", the theme of the Forum, for sustainable development, particularly related to water and health issues.

211. The Commission pointed to the important role that the secretariat could play in promoting environmentally sustainable management of natural resources, especially for the rehabilitation of coastal, mangrove and coral ecosystems and through the promotion of eco-tourism to enhance the livelihood of the people living in Pacific and other island developing countries.

212. Noting the challenges to economic development that stemmed from rising oil prices, the Commission emphasized the importance of the work of the secretariat in promoting regional and subregional cooperation for the diversification of energy resources, the development of environmentally sound energy technologies and alternative and renewable energy sources (such as microhydro, biogas, biofuel and geothermal), including small-scale projects aimed at poverty reduction. The Commission recommended that the secretariat further promote the replication of successfully implemented projects in the area of sustainable energy development, such as the initiatives under the ESCAP project on pro-poor public-private partnerships.

213. The Commission expressed appreciation to the secretariat for its efforts to promote energy cooperation in North-East Asia, including the establishment of the Intergovernmental Collaborative Mechanism for Energy Cooperation in North-East Asia and the Working Group on Energy Planning and Policy, to develop the potential for transboundary energy trade and to work towards the vision adopted under the Ulaanbaatar Statement of Senior Officials on Energy Cooperation in North-East Asia, to have "by 2020, improved energy security in North-East Asia through energy cooperation in a sustainable manner".¹

214. The Commission highlighted the importance of energy security in achieving sustainable economic growth in the region. The region had considerable potential for improving energy cooperation and creating region-wide energy infrastructure; the Commission noted the interest in an integrated trans-Asian energy system aimed at safeguarding the supply of energy resources to final consumption destinations within the region and requested that the secretariat take the necessary measures, including preliminary studies, with a view to facilitating the formulation and implementation of such a system.

215. The Commission commended the efforts of the secretariat towards the implementation of the nature conservation programme under the framework of the North-East Asian Subregional Programme for Environmental Cooperation. The importance of continuing to support the activities in the areas of abatement of air pollution from coal-fired power plants and the mitigation of the effects of dust and sandstorms in the subregion was underlined. The decision on the establishment of an institutional support mechanism for that Programme needed to be based on a consensus of all the member countries of the Programme, taking into consideration the existing financial resources and ongoing projects.

216. The Commission noted that air pollution in mega-cities was a serious problem, which caused

¹ See the report of the Senior Officials Committee on Energy Cooperation in North-East Asia on its first session, held in Ulaanbaatar on 16 and 17 November 2005 (ESD/CECNEA/Rep.).

people's health to deteriorate and had adverse effects on economic growth. It requested that the secretariat undertake a study to identify the primary sources of air pollution in mega-cities in order to enable the formulation of effective prevention and mitigation strategies. It also underlined the importance of continuing support for the implementation of the Kitakyushu Initiative for a Clean Environment, which successfully addressed major issues of urban development, including air pollution.

217. The Commission underlined the importance of maintaining the sustainable development of biological resources for the further economic development of the countries in the region. In that regard, it requested that the secretariat assist member countries in the establishment of a national biological resource centre. Furthermore, it expressed support for the secretariat to act as the focal point for a regional biological resource network to facilitate the transfer of biological resource management technologies.

218. The Commission underscored the adverse impact of natural disasters on the economic development and growth of countries in the region. It expressed appreciation for the work that had been undertaken thus far by the secretariat in enhancing the capacity of member States in disaster management, and noted the need to continue activities in disaster management and preparedness. It noted with appreciation that the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia had already been established with contributions from the Governments of Thailand and Sweden, and the member States were invited to make use of the Fund for capacity-building in the development of tsunami early warning systems, as well as to consider contributing to the Fund.

219. The Commission adopted resolution 62/7 on strengthening regional cooperation and coordination of early warning system arrangements for tsunamis through the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia.

Information, communication and space technology

220. The Commission emphasized the importance of ICST for sustainable economic and social development, and expressed full support of the outcomes of the World Summit on the Information Society. In that regard, one delegation requested that the secretariat set up a forum on Internet governance to facilitate multi-stakeholder policy dialogue.

221. The Commission supported the priority activities of the secretariat in the field of ICST identified by the Committee on Managing Globalization. In particular, it stressed the importance of strengthening national capacity for building an enabling environment, including promotion of ICST applications and strengthening human resources development in such technology. In that regard, the

secretariat was also requested to pay special attention to the needs of least developed countries.

222. In order to build an information society and to ensure secure and affordable access to information, one delegation suggested that member Governments take the following measures: invest in the production and supply of information in local languages, promote private-sector participation, develop national information infrastructure and seek international cooperation.

223. The Commission emphasized the importance of ICST in support of effective disaster reduction in the region. It noted regional initiatives, including the Sentinel-Asia project, which were aimed at providing information on disaster reduction. The Commission noted with appreciation a proposal of the Islamic Republic of Iran to host an information and communication and space technology-enabled disaster management centre under the ESCAP umbrella. In that regard, the secretariat was requested to conduct the required study and assist the Islamic Republic of Iran in enhancing capacity-building for the establishment and operation of the proposed centre.

224. The Commission welcomed with appreciation the offer made by the Government of Malaysia to host the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific in February 2007. It recommended the continuation of the Regional Space Applications Programme for Sustainable Development. The Commission noted with appreciation the continued support of member States, including India and Japan, in the implementation of the Programme and the preparations for the Conference. It encouraged all members and associate members of ESCAP to participate in the Conference. Several delegations requested the secretariat, in preparing for the Conference, to harmonize the efforts under the Programme with the outcomes of the World Summit on the Information Society, the World Summit on Sustainable Development and the World Conference on Disaster Reduction.

225. The Commission adopted resolution 62/5 on building the information society in Asia and the Pacific.

Emerging social issues

226. The Commission had before it a note by the secretariat on progress in addressing persistent and emerging social issues (E/ESCAP/1372), containing the report of the Committee on Emerging Social Issues on its second session, held in Bangkok from 1 to 3 November 2005, and information on progress attained in implementation of the resolutions of the Commission relating to persistent and emerging social issues and other related issues over the past year.

227. The Commission expressed appreciation of the comprehensive, informative and focused documentation on emerging social issues and commended the secretariat on its efforts in addressing them.

228. The Commission noted the conclusions and recommendations of the Committee on Emerging Social Issues, as contained in the report on its second session.

229. The importance of the goals of poverty eradication, employment expansion and social integration that had been adopted by the World Summit for Social Development, held in Copenhagen in March 1995, was reaffirmed. Some delegations called for continuous efforts to meet those goals and expand access for all, especially the poor, to basic social services. One delegation emphasized the need to strengthen national capacity and exchange good practices in order to better address the challenges to social development. Another delegation requested that the secretariat continue to provide technical assistance to members and associate members, and organize policy dialogues and technical training aimed at promoting social development and enhancing social integration, gender equality, equality between ethnic groups, and health and development, paying particular attention to the mainstreaming of the concerns of disadvantaged groups.

230. Some delegations recognized the social dimensions of the development process and the continuing importance of providing support for disadvantaged and vulnerable groups such as youth, older persons and persons with disabilities.

231. A number of delegations exchanged views on national experiences in addressing youth-related issues. The challenges that young people in the region faced were recognized, and ranged from poverty, lack of skills and unemployment to inadequate access to social services. The importance of meeting the development needs of young people, especially disadvantaged young people from rural areas and poor households, and unemployed youth, was recognized by one delegation, as was the need for strengthening national policies and programmes on youth. The Commission emphasized the importance of addressing the issue of youth unemployment, including unemployment among rural youth, young people with disabilities and those from minorities. It recognized the critical role of training and upgrading of skills in providing a desirable solution to the unemployment of youth.

232. The Commission requested that the secretariat continue to provide technical support and assistance to members and associate members in their efforts to promote the development of youth and enhance their employability through better investment in education, skill training, social protection and improved access to social services. The Commission also requested that the secretariat assist members and associate members in the development and strengthening of national laws and policies on youth.

233. The Commission adopted resolution 62/8 on the implementation of the International Plan of Action for the United Nations Literacy Decade.

234. One delegation emphasized the importance of ensuring child protection through legal measures, policy advocacy and social campaigns to raise awareness. It

called for assistance by the secretariat in enhancing regional cooperation in promoting child protection and combating the commercial sexual exploitation of children.

235. Some delegations shared national experiences in promoting the well-being and economic empowerment of persons with disabilities and noted the progress made in implementing the Biwako Millennium Framework for Action towards an Inclusive, Barrier-free and Rights-based Society for Persons with Disabilities in Asia and the Pacific. Members of the Commission exchanged views on efforts to remove barriers to the development of persons with disabilities, including stigmatization, discrimination and lack of access to resources and protection. The Commission expressed support for holding a high-level intergovernmental meeting on the midpoint review of the Asian and Pacific Decade of Disabled Persons, 2003-2012, in 2007.

236. One delegation commended the secretariat for its role in coordinating regional support for elaborating the draft international convention on the protection of the rights and dignity of people with disabilities and another pointed out the need for including in the text of that convention a section on women with disabilities.

237. A number of delegations shared national experiences in addressing issues relating to population ageing and meeting the needs of older persons for health and income security. The Commission expressed support for convening a high-level meeting to review the progress achieved in carrying out the Shanghai Implementation Strategy for the Madrid International Plan of Action on Ageing and the Macao Plan of Action on Ageing for Asia and the Pacific, to be held in Macao, China, in 2007.

238. Recognizing that the family remained a fundamental social institution instrumental in enhancing social integration and cohesion, and serving as a coping mechanism for individuals and communities, one delegation emphasized the need for policies to support the institution of the family. The secretariat was requested to give greater focus to analysing the family as a changing institution and family well-being, and to examining the linkages between family well-being, effective public policies, the provision of social services and intergenerational relationships.

239. The Commission acknowledged the linkage between migration and economic and social development. While emphasizing the need to combat illegal migration and strengthen laws to prevent the victimization of migrant workers, it called for strengthened regional cooperation on migration and on the protection of the rights of migrant workers. A number of delegations welcomed the convening of the High-level Dialogue on International Migration and Development to be held in New York in September 2006.

240. Some delegations exchanged national experiences in dealing with human trafficking. Noting that human trafficking was a transnational organized crime, the combating of which required close

international cooperation, one delegation called on members and associate members to enhance cooperation and strengthen their laws to prevent human trafficking and protect its victims.

241. Delegations exchanged experiences on programmes and measures taken by them to implement the Beijing Platform for Action adopted by the Fourth World Conference on Women, held in Beijing in September 1995, and the outcomes of the global and regional reviews, including measures to increase the participation of women in the political process, government and the private sector. The Commission noted with satisfaction the high level of commitment shown by many countries towards ensuring gender equality and recognizing the role of women in development and poverty reduction.

242. One delegation took note of the regional workshop on enhancing gender mainstreaming within the development programmes of member countries, organized by Indonesia in December 2005. ESCAP was requested to follow up on the recommendations adopted at that workshop. It was also requested to review and analyse the opportunities associated with globalization and its impact on women, to give priority to women's access to productive resources and to migrant and trafficked women, and to assist in strengthening national machinery for the advancement of women and in incorporating a gender dimension into each Millennium Development Goal.

243. Some delegations drew attention to the need to conduct research on areas such as women's participation in public life and gender aspects of ageing and to promote regional cooperation for entrepreneurial capacity-building for the economic empowerment of women. One delegation requested that the secretariat organize a forum on increasing women's participation in public life. Another delegation requested that the secretariat study the financial and psychosocial status of single parents, 70 per cent of whom were women.

244. The Commission commended the secretariat on its work in promoting health and development and expressed its support for the secretariat to continue work in that area in the future.

245. The Commission expressed concern about the spread of avian influenza across the region. A number of delegations outlined the contingency plans that their Governments were implementing to contain outbreaks in poultry and to prevent the disease from evolving into a pandemic. The Commission agreed on the importance of transparency and the exchange of information and technical cooperation at the bilateral, regional and global levels in order to tackle the problem effectively. It requested that the secretariat continue its collaboration with other United Nations agencies in order to assist member countries in, inter alia, creating multisectoral capacity for surveillance and a global early warning system against communicable diseases and in building stockpiles of vaccines and pharmaceuticals.

246. The secretariat was requested to work closely with agencies such as WHO in order to create capacity in areas related to the strengthening of primary health care and health systems as a means of achieving the Millennium Development Goals. The Commission emphasized the need to tackle communicable diseases, such as HIV, and non-communicable diseases in an effective manner, while avoiding duplication of work.

247. One delegation recognized the importance of health protection schemes for rural populations as an important means for reducing their poverty and improving their health.

Least developed countries, landlocked developing countries and small island developing States

248. The Commission had before it the report of the Special Body on Pacific Island Developing Countries on its ninth session (E/ESCAP/1373). It expressed appreciation to the secretariat for the comprehensive report and endorsed the recommendations contained therein, specifically those on (a) creation of employment and income-earning opportunities for vulnerable groups in Pacific island developing countries, (b) follow-up to the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States and (c) the Commission's activities in the Pacific.

249. In connection with the creation of employment and income-earning opportunities for vulnerable groups in the Pacific, some delegations recommended that the experiences relevant to Pacific island developing countries be documented and shared through policy advice and workshops. It was requested that the secretariat investigate the potential for technical cooperation and capacity development partnerships between countries in Asia and the Pacific.

250. One delegation noted the potential of the informal sector in creating employment for vulnerable groups and requested that the secretariat consider developing a comprehensive short-term labour programme to address the high rate of unemployment in Pacific island countries.

251. On the follow-up to the Mauritius Strategy, the Commission recommended that (a) the programme of work of the secretariat mainstream the priorities and commitments of the Mauritius Strategy; (b) the possible establishment of dedicated satellite communication infrastructure be considered in the light of the specific difficulties of Pacific small island developing States in responding to the outcome of the World Summit on the Information Society; (c) the collection and dissemination of data on economic and social matters be further improved; and (d) a regional review of the implementation of the Mauritius Strategy be conducted in collaboration with relevant subregional organizations in 2008.

252. With regard to the activities in the Pacific, it was proposed that a working group be set up comprising representatives of embassies and high commissions of Pacific island economies based in Fiji. The working group would meet twice a year in Suva in order to enhance the interaction between ESCAP and its Pacific island member States. The terms of reference of the working group in Suva should be formulated. To ensure broader participation of Pacific island countries which were without Suva-based missions, invitations should be sent to participants outside Fiji to attend the meeting, with no additional cost to the secretariat.

253. Several delegations noted that UN-EPOC was now strategically placed to be well integrated with the community of regional and international organizations since it had relocated to Suva. The Commission urged that the secretariat strengthen UN-EPOC so that it would be able to foster closer links between Asian and Pacific economies and make use of the South-South cooperation modality.

254. One delegation requested that the Executive Secretary consider the appointment of a suitably qualified Pacific islander to the vacant post of Head of UN-EPOC in order to build and enhance the sense of ownership among Pacific island developing countries.

255. The Commission welcomed the convening of the Pacific Leaders' United Nations ESCAP Special Session (PLUS) for the first time and expressed confidence that it would draw considerable attention to the development needs of those countries and would be to their mutual benefit.

256. The Commission noted the triennial Japan-Pacific Islands Forum Summit Meetings (PALM) hosted by Japan, as well as the Okinawa Initiative: Regional Development Strategy for a More Prosperous and Safer Pacific. Based on that Initiative, adopted at the Third Meeting held in 2003, Japan had supported the efforts of Pacific island countries in the areas of economic infrastructure, regional cooperation for preventive measures against epidemics, environmental management, distance learning and human resources development. It also noted that the Fourth Meeting would be held in May 2006.

257. Several delegations called for strengthened collaboration between UN-EPOC and other bodies, including development agencies, financial institutions, private sector organizations, non-governmental organizations and donors. The Commission urged that the secretariat design and facilitate tripartite cooperation mechanisms to support Pacific-Asia partnerships.

258. In order to ensure that the least developed countries, landlocked developing countries and small island developing States were able to attain their internationally agreed development goals, including those contained in the Millennium Declaration, the Commission noted the need for (a) a regional road map to ensure the implementation of the Jakarta Declaration on Millennium Development Goals in Asia and the

Pacific: the Way Forward 2015; (b) the commitment of adequate resources; and (c) the participation of all stakeholders. In the case of the least developed countries, the financial resources available for their development needed to be increased, their supply-side constraints addressed and market access improved; the severely indebted least developed countries in Asia and the Pacific needed to be included in recently launched debt relief initiatives.

259. The Commission took note of the recommendations contained in the report of the Regional Review of the Implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010, held in Bangkok on 14 and 15 March 2006, as the regional input into the global comprehensive review to be conducted during the sixty-first session of the General Assembly.

260. One delegation requested the Commission to support the draft resolution on the least developed countries, which had been submitted to the Commission at its current session on behalf of the 14 least developed countries in Asia and the Pacific. The Commission adopted resolution 62/11 on the implementation of the Programme of Action for the least developed countries for the Decade 2001-2010.

261. The Commission noted that, in addition to the evaluation of transit trade and transport, the establishment of economic infrastructure, trade facilitation measures and enhanced regional cooperation between landlocked and transit developing countries were essential for addressing the high transport and logistic costs in landlocked developing countries.

262. The Commission expressed appreciation to India, Indonesia, Japan and Thailand for their willingness to offer technical cooperation activities in several areas, including agriculture, disaster relief, education, energy, health, ICT, law, medicine, microfinance, poverty reduction, water resources development and environmentally sustainable development for the benefit of least developed, landlocked and island developing countries.

263. The Commission called upon all development partners to give larger focus to the least developed countries in Asia and the Pacific in their cooperation programmes and urged that greater use be made of South-South as well as trilateral modalities in the delivery of technical and economic cooperation among developing countries. It requested that the secretariat facilitate the whole process of dissemination of good practices in the diverse areas of development cooperation among the least developed countries, landlocked developing countries and small island developing States.

264. The Commission expressed appreciation to donor countries and international organizations for their support of activities implemented by ESCAP for the benefit of least developed, landlocked and Pacific island developing countries and territories.

265. The Commission adopted resolutions 62/9, on regional follow-up to the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, and 62/12, on strengthening Pacific island developing countries and territories through regional cooperation.

Management issues

Programme performance report for 2004-2005

266. The Commission had before it a note by the secretariat containing the programme performance report for 2004-2005 (E/ESCAP/1374 and Corr.1).

267. The Executive Secretary pointed out that the programme performance report for 2004-2005 reflected a continuation of the focus on results-based reporting by the secretariat.

268. The Executive Secretary informed the Commission that the highlights of programme achievements by thematic area, overall challenges and obstacles, and results and lessons learned under each of the seven ESCAP subprogrammes during the biennium 2004-2005 were included in the report.

269. The report emphasized programme achievements in 2004-2005 by focusing on more meaningful qualitative reporting of key results achieved rather than on quantitative output delivery. It was based on evidence collected from end-users of the secretariat's products and services as well as from evaluation findings covering the period under review.

270. The Commission expressed appreciation to the secretariat and welcomed the programme performance report based upon a results-based perspective. The view was expressed that the lessons learned as contained in the report would be beneficial for future programme planning. One delegation encouraged ESCAP member States to accord adequate attention to addressing the challenges, obstacles and unmet goals of the biennium 2004-2005.

271. One delegation expressed the view that the progress achieved in the development of the Asian-European transport corridors and the implementation of the four demonstration runs of container block-trains along the northern corridor of the Trans-Asian Railway should be reflected in the report for subprogramme 4, Transport and tourism.

272. One delegation expressed appreciation to the Commission for the progress made in promoting the Intergovernmental Agreement on the Asian Highway, finalizing the Trans-Asian Highway agreement, and establishing a collaborative mechanism on energy cooperation in North-East Asia.

273. Another delegation requested that the secretariat share the model for, and lessons learned from, the development of community-based social safety nets

under subprogramme 7, Social development, including persistent and emerging issues. The delegation also requested that the secretariat give further attention to supporting regional measures on managing natural disasters.

Proposed programme changes for 2006-2007

274. The Commission had before it a note by the secretariat containing the proposed programme changes for the biennium 2006-2007, and endorsed those changes (E/ESCAP/1375).

275. The Executive Secretary said that the proposed programme changes for the biennium 2006-2007 reflected the new mandates which the Commission had adopted at its sixty-first session, as well as emerging global priorities identified by the Economic and Social Council and the General Assembly. In the light of the shift from output-oriented reporting to results-based management, the secretariat had proposed only major programme changes at the output level.

276. The major changes resulted from Commission resolution 61/1 of 18 May 2005 on the mid-term review concerning the functioning of the conference structure of the Commission, whereby the work of the former subcommittees had been subsumed under the respective thematic committees.

277. The Commission endorsed the proposed programme changes for 2006-2007 and noted the secretariat's adjustment of the programme of work to cope with changing mandates and circumstances, while maintaining focus on the three thematic areas of managing globalization, poverty reduction and emerging social issues.

278. One delegation cautioned the secretariat that placing less importance on water resources and energy might bring about an imbalance and loss of focus in subprogramme 6, Environment and sustainable development, since water resources, energy and climate change were seen as essential elements of the regional follow-up to global conferences and the achievement of the Millennium Development Goals. The delegation urged the secretariat to maintain a balanced approach on the basis of mandates contained in several resolutions adopted by the Commission, including the Shanghai Declaration.

Draft strategic framework for the biennium 2008-2009

279. The Commission had before it the note by the secretariat containing the programme overview of the draft strategic framework for the biennium 2008-2009 (E/ESCAP/1376 and Corr.1). The Executive Secretary pointed out that the initial drafts of the document had been reviewed by all three thematic committees, which had met late in 2005. The document in its current form had been reviewed by ACPR in February 2006.

280. The Executive Secretary informed the Commission that the process of further developing the

programme plan of the strategic framework for the biennium 2008-2009 had been delayed pending the outcome of a review of mandates by the General Assembly.

281. The Commission endorsed the programme overview for the draft strategic framework, for eventual incorporation into the proposed biennial programme plan for 2008-2009. It also provided comments with a view to focusing ESCAP efforts on regional and subregional partnerships to expedite the achievement of the Millennium Development Goals in the ESCAP region.

282. One delegation suggested that more attention be placed on enhancing regional cooperation for the protection of children's welfare, improving the quality of education and controlling communicable diseases, especially avian influenza, HIV/AIDS, malaria and tuberculosis, during the further development of the strategic framework.

283. One delegation stressed the need to maintain poverty reduction as the overarching objective of the region for the strategic framework for 2008-2009 and requested the secretariat to note the recommendation of the Advisory Committee on Administrative and Budgetary Questions that resources for travel and the engagement of consultants be limited.

284. The delegation also suggested that it might be premature to accept a rights-based approach as a principle in the strategic framework for 2008-2009.

ESCAP guidelines for programme monitoring, review and evaluation

285. The Commission had before it a document containing an overview of the guidelines for programme monitoring, review and evaluation used by the secretariat (E/ESCAP/1377).

286. The Executive Secretary informed the Commission that the secretariat was fully committed to implementing reform measures in support of results-based management, including those related to monitoring and evaluation. The integrated programme and project monitoring and evaluation framework developed by ESCAP would enable members and associate members to assess the secretariat's performance in implementing the strategic framework and to provide feedback to the secretariat.

287. The Commission stressed the importance of results-based management and expressed its strong support for initiatives taken by the secretariat in that regard, including those relating to monitoring and evaluation. Such initiatives could help the secretariat focus on organizational learning and the incorporation of lessons learned into future programme and project planning. They could help members and associate members to provide more informed advice regarding the ESCAP programme of work. They could also help in the identification of areas of high importance as well as

areas that were obsolete, thereby ensuring that resources were used efficiently to achieve the intended results.

288. Several delegations expressed the view that the secretariat should further disseminate information on its results-based management initiatives, including its monitoring and evaluation framework, at the national and regional levels.

289. Moreover, some delegations expressed the view that that information should be complemented by training and advisory missions to specific countries to enable them to learn about and share experiences in project implementation, as well as issues relating to the financial and administrative management of projects.

290. One delegation expressed the view that adequate planning was an essential element of the successful implementation of projects and related its Government's experience with project monitoring and evaluation, including quarterly review meetings to resolve obstacles in implementation, the release of funds in accordance with workplans and actual needs, training, and the establishment of planning and monitoring cells in line ministries.

291. The Executive Secretary thanked the Commission for the constructive guidance and suggestions provided on the secretariat's programme reporting, planning, monitoring and evaluation work, and noted the Commission's general support of the programme performance report for 2004-2005, the proposed programme changes for 2006-2007 and the programme overview of the draft strategic framework for 2008-2009, as well as its support for the ESCAP guidelines for programme monitoring, review and evaluation.

Work of the regional institutions

292. The Commission had before it the reports of the regional institutions, namely, the Asian and Pacific Centre for Transfer of Technology (APCTT), the United Nations Asian and Pacific Centre for Agricultural Engineering and Machinery (UNAPCAEM), the Centre for Alleviation of Poverty through Secondary Crops Development in Asia and the Pacific (CAPSA) and the Statistical Institute for Asia and the Pacific (SIAP) (E/ESCAP/1378 and Corr.1 and E/ESCAP/1379-1381).

293. The Executive Secretary, in his introduction, emphasized his commitment to the revitalization of the regional institutions. The work of the institutions was now fully aligned with the thematic priorities of ESCAP, as reflected in the strategic framework and programme of work of ESCAP for 2006-2007. In addition, three regular budget posts at the P-5 level, one each for APCTT, UNAPCAEM and CAPSA, had been approved by the General Assembly. However, despite progress in a number of areas, the Executive Secretary noted with concern that some of the regional institutions had difficulty securing adequate funding for their activities, and urged members and associate members to provide or

increase their annual contribution to those institutions. The new Governing Councils of the Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT), UNAPCAEM and CAPSA would be constituted during the current session of the Commission.

294. The Executive Secretary also reported on the progress made in the implementation of Commission resolution 61/6 of 18 May 2005 on the establishment of the Asian and Pacific Training Centre for Information and Communication Technology for Development in the Republic of Korea. A host country agreement had been signed on 31 January 2006, and had entered into force on 16 March 2006 after its approval by the National Assembly of the Republic of Korea. The Centre would be officially opened, and the inaugural session of the Governing Council convened, in June 2006.

295. The Commission noted with appreciation the achievements of the four existing regional institutions over the course of the preceding year.

296. The Commission requested that the secretariat help the regional institutions to obtain greater financial sustainability, and urged that member and associate member countries increase their annual contributions to the institutions.

297. One delegation proposed that UNAPCAEM undertake technical cooperation activities in the area of post-harvest technology and management applied to tropical fruits as well as mechanization and automation of farm production.

298. The delegations of Malaysia and Indonesia expressed the desire of their Governments to continue working with SIAP in conducting regional courses and seminars. Specifically, the Government of Malaysia proposed to hold with SIAP, in June 2006, the Second Regional Course on Statistical Quality Management and the Fundamental Principles of Official Statistics.

299. The representative of Japan informed the Commission that the Government of Japan, through the Japan International Cooperation Agency, would provide fellowships for 75 participants in SIAP courses. The representative also requested countries to reply to the needs survey that would be conducted by the Ministry of Foreign Affairs of Japan from May to August 2006.

300. One delegation requested SIAP to increase its emphasis on e-learning and to consider involving subregional organizations, such as the Economic Cooperation Organization, in its technical cooperation programmes.

301. One delegation asked CAPSA to disseminate, through its website, examples of cases in which the production of secondary crops had alleviated poverty and improved employment.

302. Some delegations mentioned the importance of national ownership of workshops and training programmes, and requested the regional institutions to conduct more national-level workshops and courses.

303. The importance of training official statisticians in countries of the region to prepare relevant data in compiling Millennium Development Goal indicators was stressed. The delegation of Mongolia informed the Commission that it had submitted a draft resolution on strengthening statistical capacity in the region, and requested countries to support it.

304. In accordance with paragraph 9 of the statute of the UNAPCAEM, along with the host country, China, the Commission elected the following countries to the Governing Council of the Centre for the period 2006-2009: Democratic People's Republic of Korea, Fiji, India, Indonesia, Iran (Islamic Republic of), Republic of Korea, Thailand and Viet Nam.

305. In accordance with paragraph 9 of the statute of CAPSA, along with the host country, Indonesia, the Commission elected the following countries to the Governing Council of the Centre for the period 2006-2009: Bangladesh, France, India, Iran (Islamic Republic of), Japan, Pakistan, Republic of Korea and Thailand.

306. In accordance with paragraph 8 of the statute of APCICT, along with the host country, the Republic of Korea, the Commission elected the following countries to the Governing Council of the Centre for the period 2006-2009: Bangladesh, Fiji, India, Indonesia, Iran (Islamic Republic of), Kazakhstan, Mongolia and Thailand.

307. In his concluding remarks, the Executive Secretary welcomed the support of members of the Commission for the five regional institutions, and placed on record his gratitude to the host Governments of the institutions, namely China, India, Indonesia, Japan and the Republic of Korea, for their support, both financial and technical. The secretariat would continue to strengthen the work of the regional institutions to ensure that they delivered effective services to the ESCAP membership.

2005 World Summit Outcome: implications for the work of ESCAP

308. The Commission had before it a note by the secretariat presenting recommendations contained in the 2005 World Summit Outcome² and their implications for the work of the ESCAP secretariat (E/ESCAP/1382).

309. The Executive Secretary informed the Commission that ESCAP had been closely involved in a number of United Nations-wide initiatives in response to the 2005 World Summit Outcome, including preparations for a review of mandates, strengthened coordination of the Executive Committee on Economic and Social Affairs and mainstreaming gender concerns in programmes and projects. The Executive Secretary highlighted the increasing global attention being given to the development of "tightly managed entities",³ and the development of a more integrated and cohesive

² General Assembly resolution 60/1 of 16 September 2005.

³ Ibid., para. 169.

United Nations system, which, under proposals put forward by some Member States, might include merging United Nations departments, funds and programmes with mandates relating to economic and social development into one comprehensive development organization.

310. The Executive Secretary also drew the attention of the Commission to an external evaluation of ESCAP which he had recently initiated and which the Government of Japan had agreed to finance. The evaluation would assess the strategic role of ESCAP in the Asian and Pacific region and would be conducted by external evaluators to enhance its independence and credibility. ESCAP would be pleased to share the findings and recommendations of the evaluation with members and associate members, and hoped that the recommendations would provide valuable inputs into deliberations on United Nations reform.

311. The Commission welcomed the efforts of ESCAP to identify and take follow-up action with regard to the 2005 World Summit Outcome, and its efforts to support follow-up of the outcomes of other major United Nations conferences and summits, with particular emphasis on the Millennium Development Goals and according priority to least developed countries, landlocked developing countries, economies in transition and Pacific island developing countries.

312. One delegation noted with satisfaction that gender mainstreaming was central to the efforts of ESCAP in following up the 2005 World Summit Outcome and, towards that end, urged that ESCAP develop initiatives based on the recommendations of the Regional Workshop on Enhancing Gender Mainstreaming within the Development Programmes of ESCAP Members, held in Jakarta in December 2005 in partnership between ESCAP and the Government of Indonesia.

313. Some delegations welcomed the forthcoming review of the ESCAP conference structure mandated by Commission resolution 58/1 of 22 May 2002, which was to be carried out during the sixty-third session of the Commission in 2007. That effort would be important not only for effective follow-up to the 2005 World Summit Outcome, but also for ensuring that the work of ESCAP was well targeted and implemented effectively, and at the same time avoided the possibility of "forum fatigue".

314. One delegation noted with satisfaction that the revitalization of the ESCAP programme on South-South cooperation and the integration of that modality more explicitly into the ESCAP programme of work had been identified as a major issue in incorporating recommendations of the 2005 World Summit Outcome into the work of ESCAP. The delegation recommended that ESCAP develop a role as facilitator of tripartite arrangements and forge closer collaboration with existing South-South cooperation modalities, including the Non-Aligned Movement Centre for South-South Technical Cooperation, based in Jakarta.

315. Some delegations noted that the review of mandates in response to the 2005 World Summit Outcome, which was being carried out by the United Nations Secretariat, might include discussions on programmes of the regional commissions in relation to those of other United Nations entities, such as the Department of Economic and Social Affairs.

316. In that regard, one delegation expressed support for the initiative of the Executive Secretary to carry out an external evaluation of ESCAP, which would provide valuable input into that process.

317. One delegation expressed the view that areas identified by the secretariat for a review of global-regional linkages of mandates should be examined more closely. In particular, in the area of trade and investment, there was a need to clarify the relationship between the roles of the regional commissions and UNCTAD and, in the area of population, proposals on institutional reform for managing migration might be raised in General Assembly meetings.

318. One delegation noted that decisions relating to the United Nations review of mandates, the reform of the Economic and Social Council and the broader reform of United Nations entities addressing economic and social issues would be taken by appropriate forums at the global level.

319. The Executive Secretary concluded by noting that the ensuing year would be a critical one for United Nations reform in the context of the 2005 World Summit Outcome. The Executive Secretary expressed his commitment to the further reform of the ESCAP secretariat and his belief that the external evaluation to be undertaken in the coming months would serve as a good basis for that process.

Technical cooperation activities of ESCAP and announcement of intended contributions

320. The Commission had before it a note by the secretariat containing an overview of the secretariat's technical cooperation activities and extrabudgetary contributions in 2005 (E/ESCAP/1383 and Corr.1).

321. The Executive Secretary informed the Commission that, in pursuance of Commission resolution 60/3 of 28 April 2004 on the work of ESCAP in implementing its technical cooperation projects, ESCAP had continued its reform efforts in line with its technical cooperation strategy. The primary goals of the reform were to increase the impact of the secretariat's technical cooperation work and to add value to its analytical and normative work. In that regard, the Executive Secretary emphasized the secretariat's efforts to revitalize its South-South cooperation programme in order to enhance its relevance, and contribute and add value, to the ESCAP programme of work.

322. The Executive Secretary emphasized that the overarching aim of the ESCAP technical cooperation

programme was to assist member countries, through capacity-building, in achieving the Millennium Development Goals. ESCAP projects continued to focus mainly on five of the eight Goals, 1, 3, 6, 7 and 8, in which it had a strong comparative advantage. The Executive Secretary drew the attention of the Commission to one of the main technical cooperation achievements in 2005, the launch of the second regional report on the Millennium Development Goals,⁴ prepared under a unique, tripartite partnership between ESCAP, UNDP and ADB. That first-ever partnership between a United Nations regional commission, a United Nations development agency and a regional development bank had been globally recognized as a "best practice" for advocating the achievement of the Millennium Development Goals.

323. The Executive Secretary informed the Commission that in 2005 natural disasters had come to the forefront of the region's challenges, and that was reflected in the key priority areas of the secretariat. Natural hazards impeded poverty alleviation and had an adverse impact on the achievement of the Millennium Development Goals. Natural disaster preparedness and prevention, in particular in the aftermath of the Indian Ocean tsunami that had devastated many parts of the Asian and Pacific region, had become one of the key priorities of ESCAP in 2005. The Executive Secretary noted that, while the ESCAP mandate did not cover emergency relief, the role of ESCAP as a regional commission was to promote regional cooperation in the long-term recovery process and to enhance preparedness for future disasters.

324. The Executive Secretary highlighted the launch late in 2005 of the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia, with a \$10 million contribution by the Government of Thailand and a subsequent contribution of \$2.5 million from the Government of Sweden. The Fund, which was being managed by the secretariat as a contribution to the broader United Nations response, would aim at strengthening capacity in early warning arrangements for the region. The Executive Secretary expressed the hope that other Governments would soon join those of Thailand and Sweden so that the Fund could be further capitalized.

325. The Executive Secretary reported to the Commission that the total contributions received by ESCAP in 2005 for technical cooperation, from sources within and outside the United Nations, amounted to \$25,431,007, representing an increase of close to 300 per cent over amounts contributed in 2004. In terms of delivery, the value of ESCAP technical cooperation in 2005 totalled approximately \$13 million.

⁴ *A Future Within Reach: Reshaping Institutions in a Region of Disparities to Meet the Millennium Development Goals in Asia and the Pacific* (United Nations publication, Sales No. E.05.II.F.27).

326. The Commission commended the secretariat for its comprehensive report on technical cooperation activities in 2005. It noted with satisfaction that the secretariat had continued its reform efforts aimed at increasing the impact of its technical cooperation work and adding value to the normative and analytical work of the secretariat. It also noted the highlights of the accomplishments of ESCAP set out in the report, particularly with regard to the attainment of the Millennium Development Goals in the region. In that connection, the Commission commended the secretariat for the first-ever tripartite partnership with UNDP and ADB.

327. One delegation requested that the secretariat undertake more technical assistance activities in order to develop national ICT policies and to promote the use of free and open-source software in bridging the digital divide between and within countries in the region. The same delegation made special mention of the progress made on the Asian Highway network and its role in promoting intercountry trade and tourism. It expressed the hope that the network would be complemented soon with corresponding shipping services that would link outlying islands with the Asian mainland.

328. The Commission also noted the importance that Governments attributed to the technical cooperation activities of ESCAP, including through South-South cooperation. Several delegations expressed strong commitment to the technical cooperation activities of ESCAP through their continued support for ESCAP projects and regional institutions.

329. The Commission noted the following contributions pledged by members and associate members for 2006.

330. *Brunei Darussalam.* The delegation of Brunei Darussalam announced the following contributions:

	\$
Pacific Trust Fund	1 000
SIAP	15 000

331. *Cambodia.* The secretariat had received written notification that the Government of Cambodia would make the following contributions:

	\$
ESCAP programme of work	1 000
SIAP	1 000

332. *China.* The delegation of China mentioned that its Government had increased its contribution to ESCAP since 2000 and announced that the Government of China would make the following contributions for 2006:

	RMB 1 000 000 and \$150 000
ESCAP technical cooperation trust funds and special projects	
	\$
APCTT	20 000
SIAP	40 000

The delegation of China reconfirmed its pledge of \$3.8 million in support of UNAPCAEM over a five-year period. With regard to the other ESCAP regional institutions and projects, the Government of China would make further decisions in the future and provide information about them in due course. The delegation of China expressed its Government's intention to increase its contribution to ESCAP gradually.

333. *India.* The delegation of India indicated that its Government would make the following contributions for 2006:

	\$
APCTT	200 000 (equivalent in rupees)
UNAPCAEM	15 000
SIAP	15 000
CAPSA	10 000

The Government of India would also contribute Rs 5.87 million (equivalent to \$131,734) to a new APCTT project on building capacity for "scouting", documentation, database development and dissemination of "green" grass-roots innovations in the Asian and Pacific region.

334. *Indonesia.* The delegation of Indonesia invited ESCAP to explore possible joint projects with the Non-Aligned Movement Centre for South-South Technical Cooperation, based in Jakarta, in order to address the needs of developing member countries. For 2006, the Government of Indonesia intended to provide the same level of contributions to the regional institutions as in the previous year, with the exception of CAPSA, for which an additional amount of approximately Rp 363 million would be provided for vehicles and other operational equipment, in addition to the annual contribution of Rp 767 million.

335. *Iran (Islamic Republic of).* The delegation of the Islamic Republic of Iran announced that its Government would make the following contributions:

	\$
ESCAP programme of work	20 000
SIAP	10 000
APCTT	10 000
UNAPCAEM	15 000

The Government of the Islamic Republic of Iran expressed its willingness to provide, within five years, up to \$10 million, in kind and cash, for the establishment and operation of the proposed Asian and Pacific ICST-enabled disaster management centre in its territory, affiliated with ESCAP.

336. *Japan.* The delegation of Japan emphasized the importance of coordination with other United Nations agencies to avoid duplication. It announced that the Government of Japan would make the following contributions for its fiscal year 2006:

	\$
ESCAP programme of work (Japan-ESCAP Cooperation Fund)	192 793
SIAP	1 695 880 (and in-kind contributions in the amount of \$1,638,100)
Project on ICT policies and programmes for development	160 000

Furthermore, the Government of Japan would continue to support the technical cooperation activities of ESCAP through the Human Security Fund, focusing on social protection schemes in tsunami-affected areas, and the Human Dignity Initiative.

337. *Lao People's Democratic Republic.* The secretariat had received written notification that the Government of the Lao People's Democratic Republic would make the following contribution:

	\$
ESCAP programme of work	2 000

338. *Macao, China.* The secretariat had received written notification that the Government of Macao, China, would make the following contribution:

	\$
SIAP	15 000

339. *Malaysia.* The delegation of Malaysia announced its Government's contributions as follows:

	\$
APCTT	15 000
SIAP	10 000

The Government of Malaysia would also contribute \$50,000 to the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) and \$19,436 to the Asian and Pacific Coconut Community.

340. *Mongolia.* The secretariat had received written notification that the Government of Mongolia would make the following contribution:

	\$
SIAP	2 000

341. *Myanmar.* The secretariat had received written notification that the Government of Myanmar would make the following contributions:

	\$
ESCAP programme of work	2 000
SIAP	1 000

342. *New Caledonia.* The secretariat had received written notification that the Government of New Caledonia would make the following contribution:

	\$
Pacific Trust Fund	5 000

343. *Pakistan.* The secretariat had received written notification that the Government of Pakistan would make the following contribution:

	\$
SIAP	15 000

344. *Philippines.* The delegation of the Philippines confirmed its Government's intention to continue to contribute to the regional institutions. At the time, no specific amounts could be indicated, since the Government's budgetary process had not yet been concluded.

345. *Republic of Korea.* In addition to its contribution to the Republic of Korea-ESCAP Cooperation Fund, the delegation of the Republic of Korea announced that its Government would make the following contributions:

	\$
UNAPCAEM	10 000
APCTT	10 000
CAPSA	10 000
SIAP	10 000

346. *Thailand.* The delegation of Thailand announced that its Government would make the following contributions:

	\$
APCTT	15 000
UNAPCAEM	15 000
CAPSA	10 000
SIAP	20 000
Trust fund for the participation of the disadvantaged economies in transition and Mongolia	2 000
Pacific Trust Fund	1 000

The Government of Thailand would also contribute \$40,000 and 1,550.043 baht to CCOP, \$12,000 to the Typhoon Committee and \$2,000 to the Tropical Cyclones Trust Fund.

347. *Viet Nam.* The secretariat had received written notification that the Government of Viet Nam would make the same contributions as in the previous year to the ESCAP programme of work, UNAPCAEM and APCTT.

348. In concluding, the Executive Secretary noted that the secretariat had been successful in raising its technical cooperation profile during past years owing to strong support from key donors and partners and the secretariat's efforts to enhance the quality and impact of its technical cooperation projects. The secretariat thanked those Governments which had pledged their financial support to the technical cooperation work of

the secretariat. It encouraged the others to consider providing both financial and technical support for the various projects for promoting regional cooperation in the economic and social sectors. The secretariat assured the Commission that every effort would be made to respond to the needs of the members and associate members in the design of the technical cooperation programme, particularly by addressing the needs of the developing member countries and territories in attaining the Millennium Development Goals.

Activities of the Advisory Committee of Permanent Representatives and Other Representatives Designated by Members of the Commission

349. The Commission had before it the report of ACPR (E/ESCAP/1384 and Add.1), which had been introduced by the representative of Australia in lieu of the ACPR Rapporteur.

350. In keeping with its terms of reference, ACPR had maintained close cooperation between the members and the secretariat of the Commission, advised the Executive Secretary on issues relating to the work of ESCAP and reviewed relevant documents prior to their submission to the Commission.

351. Since the sixty-first session of the Commission, ACPR had held eight regular sessions, two informal sessions and three meetings of the Informal Working Group on Draft Resolutions. At its regular sessions, ACPR had considered a number of issues related to programme planning, monitoring and evaluation, including the report on programme performance for 2004-2005, the outcome of the review by the Advisory Committee on Administrative and Budgetary Questions of the ESCAP programme budget for 2006-2007, preparations for the strategic framework for 2008-2009 and the proposed calendar of meetings and training programmes for the period from January to December 2006.

352. ACPR had been actively involved in reviewing the outcomes of recent sessions of the Commission, in particular the report on the implementation of resolutions adopted by the Commission at its sixty-first and previous sessions. It had also worked with the secretariat in planning for the sixty-second session of the Commission and reviewing initial plans for the theme topic of the sixty-third session. ACPR had also reviewed and discussed preparations for, and outcomes of, the second sessions of the Committee on Managing Globalization, the Committee on Emerging Social Issues and the Committee on Poverty Reduction, as well as other key meetings organized by the secretariat, including the Intergovernmental Meeting to Develop the Intergovernmental Agreement on the Trans-Asian Railway Network, held in Bangkok from 28 to 30 November 2005, the High-level Intergovernmental Meeting on Sustainable Tourism Development, held in

Bali, Indonesia, from 7 to 9 December 2005, the first sessions of the Governing Councils of UNAPCAEM, APCTT and SIAP and the second session of the Governing Council of CAPSA.

353. ACPR had also debated issues related to its revitalization and had reviewed the intergovernmental mechanisms of other regional commissions. A monthly briefing by the secretariat on "ongoing ESCAP initiatives" had enabled ACPR members to comment on projects and issues during their implementation.

354. The Commission expressed appreciation for the extensive work ACPR had carried out during the previous year, including inputs for preparation of the draft strategic framework for 2008-2009 and preparations for the sixty-second session of the Commission.

355. The Commission expressed support for the important role of ACPR in ensuring a constructive and effective dialogue between ESCAP members and the secretariat, and encouraged members of the Commission to attach priority to the role of ACPR.

356. The Commission further suggested that the advice and proposals put forward by ACPR members be given serious attention and appropriate efforts made to follow the advice and carry out the proposals.

357. One delegation expressed the view that ACPR should accord increased priority to reviewing the follow-up to resolutions adopted by the Commission at previous sessions.

358. The Executive Secretary concluded by expressing his deep appreciation to ACPR members for their commitment to discussions in the Advisory Committee, and stated that he looked forward to continuing engagement in the year ahead, in particular in addressing significant challenges related to United Nations reform.

Reports of regional intergovernmental bodies

Coordinating Committee for Geoscience Programmes in East and Southeast Asia

359. The Commission had before it the report of the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP), transmitted for information under a note by the secretariat (E/ESCAP/1385).

360. The Commission was informed of the activities of CCOP for 2005, which had been focused on enhanced coordination of the geoscience programmes of geoscientific institutions in member countries, continued human resources development, institutional capacity-building and greater flow of technical information between the member countries, cooperating countries and cooperating organizations.

361. A variety of cooperating countries and organizations supported activities under three CCOP sectors. In the georesources sector, activities included a petroleum policy and management project, institutional capacity-building in CCOP member countries and community and small-scale mining in Asia. In the geo-environment sector, project activities included the development of techniques on landslide hazard assessment, training of young scientists involved in volcanic hazard mitigation, coastal zone programmes and training on current issues in geoscience. For the geo-information sector, project activities to improve the management of geoscientific information included work on the *Asian Multilingual Thesaurus of Geosciences* and the development of a bibliographic database in the Southeast Asian Network for a Geoscience Information System.

362. The Commission was informed of the continuous support of the Government of Thailand and the initiatives undertaken by CCOP in collaboration with the Department of Mineral Resources of Thailand in organizing two international seminars in response to the 26 December 2004 Asian tsunami disaster. A project document had been developed focusing on tsunami hazards as part of scientific initiatives requiring urgent and concerted actions, which included risk assessment for forward planning, risk mitigation and coastal rehabilitation. The Commission was also informed that the Government of Norway supported the project on tsunami risk reduction measures with focus on land use and rehabilitation, which had commenced in 2005.

363. The Commission noted with appreciation the work of CCOP. Some delegations extended appreciation to the countries and organizations that supported CCOP, particularly the Government of Thailand through its Department of Mineral Resources for facilitating smooth and efficient operations in Bangkok.

364. The Commission was informed of the need for strengthened coordination between CCOP and the secretariat in post-tsunami risk assessment, disaster rehabilitation and mitigation efforts.

Mekong River Commission

365. The Commission had before it the report of the Mekong River Commission (MRC), transmitted for information under a note by the secretariat (E/ESCAP/1386).

366. The Commission was informed of the celebrations in 2005 marking the tenth anniversary of the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin and the establishment of the Mekong River Commission.

367. The report outlined the strategic plan for 2006-2010, which remained oriented towards "an economically prosperous, socially just and environmentally sound Mekong River Basin". The plan provided for an updated organizational, programme and

budget structure. The plan also introduced the Mekong Programme, a regional programme for the sustainable development of water and related resources in the Mekong River Basin. The Commission was informed that the Programme would enable MRC to address the development opportunities of the Mekong River Basin in a more comprehensive, balanced and sustainable manner.

368. The Commission noted with appreciation the work conducted by the Mekong River Commission in 2005 and the strong support from donors and partners, including the Flood Management and Mitigation Programme, the Navigation Programme, the Basin Development Plan and the Water Utilization Programme.

369. The Commission was informed of the decision of MRC to develop new programmes on drought management, information and knowledge management, and hydropower.

Typhoon Committee

370. The Commission had before it the report of the Typhoon Committee, transmitted for information under a note by the secretariat (E/ESCAP/1387).

371. The Typhoon Committee informed the Commission of the activities carried out by its members in 2005, including important achievements, as well as the major issues and future directions in meteorological, hydrological and disaster prevention and preparedness, and research and training.

372. It also informed the Commission of the re-establishment of two groups within the Committee: (a) the Typhoon Committee Research Coordination Group, which would continue overseeing the implementation of research and training activities, such as the Typhoon Committee fellowship scheme and roving seminar in 2006; and (b) the Working Group on Resource Mobilization, which would be responsible for the development of a resource mobilization database.

373. One delegation mentioned the need to enhance regional cooperation and exchange of information on tropical cyclone track and intensity forecasts, storm surges, destructive winds, rainfall and flood forecasting and exchange of radar images.

374. The Commission recognized the importance of the work of the Typhoon Committee and noted with appreciation the commitment and support of the Committee's members and donors. The Commission also called for the Committee to pursue closer collaboration with intergovernmental bodies.

Panel on Tropical Cyclones

375. The Commission had before it the report of the Panel on Tropical Cyclones, transmitted for information under a note by the secretariat (E/ESCAP/1388).

376. The Commission noted with satisfaction the work of the Panel in 2005 under the meteorological, hydrological, natural disaster prevention and preparedness, training and research components of its programme of work.

377. The representative of the Panel informed the Commission of the public awareness raised by the occurrence of cyclones and the related mitigation measures of the Regional Specialized Meteorological Centre for Tropical Cyclones, located in New Delhi.

378. A strong spirit of cooperation existed among Panel member countries having international river basins with regard to the exchange of hydrological data, especially for flood forecasting. The Panel urged that such cooperation continue in order to further improve flood forecasting services for the better protection of people's lives.

379. The Commission was informed of the Panel's request to WMO to upgrade the Global Telecommunication System (GTS) in some Panel member countries in order to address the requirements for tsunami-related information exchange in the Indian Ocean Rim. The Commission noted with satisfaction that financial support for GTS upgrade had been obtained for three countries, Bangladesh, Myanmar and Pakistan.

380. The Commission was also informed of the Panel's request to WMO and ESCAP to continue to support activities of the Panel in the key areas of meteorology, hydrology, disaster prevention and preparedness, training and research. It recognized the importance of tsunami early warning as part of the common efforts to promote multi-hazard early warning systems in the region and requested that WMO, ESCAP and international organizations increase their assistance to the Panel and to its members in that respect.

381. The Commission was informed that the economic impact of natural disasters had shown a marked upward trend for several decades. Developing countries, especially the least developed countries, were particularly affected by those hazards, which increased their vulnerability and set back their economic and social growth.

382. One delegation informed the Commission of the experience of its Government in mitigating the effects of cyclones and reducing casualties, and offered to contribute more to efforts in that area.

Date, venue and theme topic of the sixty-third session of the Commission

383. The Commission had before it document E/ESCAP/1389. In view of the significance of 2007 as the sixtieth anniversary year of the founding of the regional commission for Asia and the Pacific, the Commission decided to keep open the date and venue of its sixty-third session for further consideration by

Governments of ESCAP members that might have an interest in hosting the session. In that regard, the secretariat would consult with ACPR and aim for decisions that could be submitted to the Economic and Social Council at its substantive session in July 2006.

384. With regard to the theme topic, the deliberations focused on two options: (a) "Development of health systems in Asia and the Pacific" and (b) "Harnessing economic growth for achieving the Millennium Development Goals".

385. A total of 10 delegations expressed views favouring a more focused formulation that would address the alarming lack of progress on the health-related Millennium Development Goals in the Asian and Pacific region, despite the success achieved in poverty reduction, as had been identified in the joint ESCAP-UNDP-ADB report, *A Future Within Reach: Reshaping Institutions in a Region of Disparities to Meet the Millennium Development Goals in Asia and the Pacific*.

386. Two delegations suggested that the title of the theme topic for the sixty-third session reflect the importance of economic growth. They contended that economic growth, as the engine of development, was necessary for the development of health systems and should be mentioned specifically in the title of the theme study for the sixty-third session. They also felt that, without a reference to "economic growth" in the title, the theme study could run the risk of being reduced to a debate around social issues. Those delegations in favour of a more sharply focused theme topic pointed out that a formulation that simply combined "economic growth" and "development of health systems" for achievement of the Millennium Development Goals was too broad and of limited value as a theme topic for a session of the Commission.

387. The Commission agreed on the following as the theme topic for its sixty-third session: "Development of health systems in the context of enhancing economic growth towards achieving the Millennium Development Goals in Asia and the Pacific".

Ministerial Round Table on Enhancing Regional Cooperation in Infrastructure Development, including that Related to Disaster Management

388. The Ministerial Round Table was divided into two sessions. The first session covered a presentation by the Executive Secretary of ESCAP on the theme topic "Enhancing regional cooperation in infrastructure development, including that related to disaster management". The second session covered presentations by H.E. Mr. Maatia Toafa, Prime Minister of Tuvalu; H.E. Mr. M. Saifur Rahman, Minister for Finance and Planning, Bangladesh; H.E. Mr. Kaliopate Tavola, Minister for Foreign Affairs, Fiji; H.E. Mr.

Sarath Amunugama, Minister of Public Administration and Home Affairs, Sri Lanka; Mr. Roestam Sjarief, Secretary General, Department of Public Works, Indonesia; and Mr. Zhang Wanhai, Permanent Representative of China to ESCAP.

389. In his presentation, the Executive Secretary summarized the contents of the theme study, highlighting the importance of infrastructure development in enhancing economic growth and social development, and the crucial role of regional cooperation. The Executive Secretary elaborated the two-track approach of ESCAP to regional cooperation. Under the first track, ESCAP had undertaken a number of cross-border initiatives in the areas of transport, energy, ICT and water.

390. Under the second track, dealing with regional financial cooperation, the Executive Secretary discussed financing needs for infrastructure development, the resource gap and the options available to bridge that gap. Four options were suggested for financial intermediation of surplus savings in the region:

(a) Expansion of the mandate of the Asian Development Bank to focus more on infrastructure financing;

(b) Expansion of the Asian Bond Fund, in terms of both geographical coverage and size;

(c) Operationalization, reinvigoration and consolidation of existing subregional banks and funds;

(d) Establishment of a new institution, that is, an Asian investment bank along the lines of the European Investment Bank.

391. The Executive Secretary suggested the formation of an intergovernmental task force to evaluate those options further. Presentations by other panelists followed that of the Executive Secretary.

392. In his presentation, the Prime Minister of Tuvalu pointed to the crucial role of infrastructure, especially maritime and ICT infrastructure, in the socio-economic development of developing countries, especially small island developing countries. The Prime Minister drew the attention of the Round Table to the constraints faced by the island developing countries. The constraints included their small size, which prevented the exploitation of economies of scale, and their small and dispersed populations, fragile environment and proneness to natural disasters. The Prime Minister made special mention of regional cooperation in disaster management and post-disaster recovery, and informed the Round Table of the lack of access of island countries to finance from international capital markets. The Prime Minister suggested that regional cooperation could help overcome those constraints.

393. The Minister for Finance and Planning of Bangladesh mentioned that economic development was dependent on macroeconomic stability, an enabling

environment and physical and social infrastructure. The resources available for infrastructure development, such as energy and transport, were insufficient, except in the case of some developed countries, and more resources needed to be generated, especially from internal sources. Investment in transport infrastructure, especially rural roads, enhanced growth and reduced poverty. In the context of regional cooperation, the Minister identified a number of difficulties in the area of power and water which needed to be addressed. The Minister offered assistance to other countries on best practices for disaster management, of which Bangladesh had extensive experience.

394. The Minister for Foreign Affairs of Fiji identified several aspects of regional cooperation which were important for island developing countries, consisting of transport networks, including cooperation with the commercial sector in airline industries, waste management and the development of biofuel. With regard to infrastructure financing, the Minister highlighted the importance of public-private partnerships and the concept of build, operate and transfer and stated the need for new and innovative ideas in the area of infrastructure financing.

395. The Secretary General of the Department of Public Works of Indonesia highlighted the challenges and policy direction in human settlements and infrastructure development, as well as the principle of "infrastructure for all", which Indonesia applied to economic growth, development and social welfare. The Secretary General observed that the paucity of funds from budgetary sources was creating a large gap in the area of infrastructure investment and maintenance. Furthermore, Indonesia was following three modalities for financing infrastructure projects: market-based financing, public financing of pro-poor infrastructure and promoting public-private partnerships. The Secretary General requested that ESCAP work towards strengthening financing modalities for infrastructure investment and forge close collaboration with international agencies and development banks.

396. The Minister of Public Administration and Home Affairs of Sri Lanka mentioned the lack of financial resources as a major constraint on infrastructure development and explained the difficulties of developing countries in accessing international capital markets. The region's capital was flowing out of the region for lack of secure investment opportunities. The attention of the Round Table was drawn to regional mechanisms to mobilize resources for financing infrastructure. The Minister emphasized the importance of bridging the gap between potential investors and borrowers by providing guarantees and co-financing and by putting in place risk mitigation mechanisms. The Minister highlighted the importance of improved transparency, accountability and sound macroeconomic policies, and the need for a "blue-ribbon" committee to examine the possibility of enhancing the availability of funds, as well as ensuring that recipients satisfied the basic disciplines regarding investment.

397. The Permanent Representative of China to ESCAP noted that infrastructure development was known for being investment-consuming and having long pay-back periods. The shortage of funds for infrastructure development was a common problem in Asian and Pacific countries, particularly developing countries. The region needed to generate new ideas and open diverse channels for fund-raising in order to ensure adequate investment in infrastructure. The Permanent Representative suggested that the potential of existing fund-raising channels be tapped first. However, Governments, using their credibility as a guarantee, could issue construction treasury bonds in order to mobilize private capital. In addition, ADB and other multilateral institutions which had long experience in financing projects should engage in infrastructure development and provide more financial support. The Permanent Representative highlighted the gradual establishment of market-based fund-raising channels, and suggested that any reform with regard to fund-raising mechanisms be a gradual process of exploration and suited to national conditions.

398. During the discussion, it was requested that the secretariat continue its activities to improve access to energy, safe drinking water and sanitation, as those constituted the basis for sustainable development and achievement of the Millennium Development Goals. That could be accomplished through public-private partnership projects and programmes in water and energy infrastructure development. In view of the impact on the environment, the Round Table noted the need to take into account environmental sustainability and the eco-efficiency of resources when developing infrastructure.

399. The Round Table recognized the importance of measures to improve the efficiency of the energy sector, and underlined the role of renewable energy, including biofuel and its role with regard to rural development. It requested that the secretariat facilitate the exchange of experience and knowledge on clean technology, undertake research and provide policy advice for the development of strategic plans for energy efficiency and renewable energy. The Round Table noted the proposal for a regional energy cooperation mechanism for better planning and coordination in order to strengthen energy security in the region.

400. The Round Table noted that current investments in water infrastructure were considerably lower than needed because of low returns, long-term payment periods and the lack of a conducive environment for private investors. Thus, there was a need to improve commercial viability in developing certain types of infrastructure. The Round Table emphasized that the secretariat needed to promote and facilitate information and technology exchange on best practices and build capacity in water treatment and waste management, with opportunities for private-sector involvement. It underlined the importance of the work of the secretariat in strengthening regional and

subregional cooperation for enhancing infrastructure development. Particular attention was drawn to the Asia-Pacific Water Forum, which was an important regional initiative for water resource management and conservation.

401. The Round Table was informed of the activities of the United Nations Special Programme for the Economies of Central Asia, which enhanced the integration of Central Asia into the global economy through subregional cooperation in water and energy conservation, and trade.

402. The Round Table recognized that direct investment by Governments remained the main source of funds for infrastructure development. It noted the potential for fund-raising by Governments, using mechanisms such as improvements in the efficiency of fiscal systems, government guarantees, the issuance of long-term construction treasury bonds to attract private and corporate capital and the use of policy incentives to attract foreign investment. The Round Table recognized that the development of domestic financial markets was a key to raising capital. However, that was a gradual process which needed to take into account the conditions prevailing in different countries. One delegation noted that the system of its Government had started with completely central budgetary planning, moved to market allocation supplemented by central planning, and was currently using a basically market-based model for many of its infrastructure projects, including the development of high-speed rail.

403. In view of the increasingly rapid development of transport in the ESCAP region, continuous policy guidance was required at the ministerial level to address emerging issues and promote regional integration. Support was expressed for a proposal for secretariat assistance in convening regional meetings of ministers of transport on a biennial basis, following a similar approach to that of the European Conference of Ministers of Transport.

404. The Round Table noted that ICT constituted basic infrastructure that required a large sum of capital investment. As the private sector should play a leading role in its development, public-private partnership was essential. To encourage such partnership, one country requested that the secretariat initiate a forum on ICT infrastructure.

405. The Round Table noted the special limitations faced by the Pacific island countries, as their fragile environment made them susceptible to natural disasters and their size prevented them from realizing economies of scale in infrastructure development. Regional cooperation could overcome some of those limitations, especially in the area of telecommunication. In that context, the Round Table recommended that the secretariat develop a regional mechanism to manage natural disasters, including a regional multi-hazard early warning system.

406. The Round Table recognized that the Asian and Pacific region was prone to natural disasters. The

application of appropriate technology, such as radar and satellite systems, and telemetering, was one means of alleviating the destructive effects of natural disasters. It was requested that the secretariat play a more active role in enhancing regional cooperation in the establishment of early warning systems among vulnerable countries and work towards enhancing system coherence among them and ensuring more effective early warning of natural disasters.

407. The Round Table noted that there were many organizations and national centres in the region dealing with natural disasters and expressed concern over the establishment of a new institution for that purpose. Some delegations requested that the secretariat pay attention to effective coordination among existing organizations and conduct a study on the need for the region and individual countries to avoid duplication.

408. The Round Table strongly supported the development of public-private partnerships in the development of infrastructure. It noted that there were many obstacles to such participation, including the following:

- (a) Lack of conducive and transparent legal frameworks for private-sector involvement in infrastructure projects;

- (b) Inadequate technical and administrative planning of projects submitted for funding;

- (c) Constant revision of technical and administrative arrangements relating to the implementation of projects, which led to delays that created difficulties for funding agencies;

- (d) Abandonment of, or long-standing delays in, major projects;

- (e) Delays in procurement and finding the requisite project elements, such as land, water, power and environmental approval for foreign-funded projects;

- (f) A slow-moving bureaucracy which hindered implementation;

- (g) Corruption and lack of transparency.

409. On the subject of corruption, one delegation urged members and associate members to implement the United Nations Convention against Corruption. It reiterated that putting good governance principles into action through competition and objective predetermined criteria in decision-making, and the adoption of measures that were effective in preventing corruption, could go a long way in the process of mobilizing resources for infrastructure development. The Round Table requested that the secretariat undertake activities designed to assist members and associate members in addressing those issues.

410. Two delegations drew attention to the investment needs of the region, which were very large. The shortfall in resources or the infrastructure gap could be \$180-220 billion per year. While acknowledging

that there were significant unmet investment needs in the region, one delegation noted that a quantification of those needs signifying the infrastructure gap might not be precise as there were too many variables that were influenced by the investment regimes.

411. The Round Table discussed alternative modalities for bridging the financing gap. It suggested that the mobilization of all types of resources, such as trade, private-sector and human resources, in addition to financial resources, was necessary. It observed that strengthening the mandate of existing institutions, especially that of ADB, as suggested by the secretariat, could be an effective option in view of the cost involved in establishing a new institution. The Round Table noted the view that a cautious approach needed to be taken when considering the establishment of a new institution, so as not to duplicate the activities of existing institutions and to avoid the risk that a new institution would crowd out the private financing of infrastructure. It was suggested that a detailed study be conducted to analyse the pros and cons of such an institution. The Round Table also discussed the option of expanding the Asian Bond Fund to stop capital outflow, so that the region's savings could be kept within the region.

412. It was further suggested that ESCAP undertake a study on best practices for obtaining funds from international markets and provide technical assistance to countries when requested. The study could be undertaken by an intergovernmental task force. However, some delegations held the view that the establishment of such a task force could be premature. The Round Table suggested that the ESCAP secretariat study all new initiatives for fund-raising carefully and put forward feasible proposals, making use of available information and expert resources.

413. The Executive Secretary summarized the discussion and stated that ESCAP had put forward four options for financing infrastructure investment. The Executive Secretary emphasized that ESCAP was

neutral with regard to those proposals. If the member States provided ESCAP with the requisite mandate, it could conduct further detailed and elaborate technical studies on those options and report back to the Commission.

Special session on the Intergovernmental Agreement on the Trans-Asian Railway Network

414. The Executive Secretary of ESCAP gave a brief presentation concerning the Intergovernmental Agreement on the Trans-Asian Railway Network as an example of regional cooperation in infrastructure development.

Other matters

Special briefing on avian influenza

415. The Commission was briefed by Dr. David Nabarro, Senior United Nations Coordinator for Avian and Human Influenza, on the implications of the avian influenza situation for ESCAP members and associate members. The Coordinator explained the reasons why avian influenza was of critical importance to health and economies and why a strategic, multipronged approach was necessary to tackle the disease. The Coordinator introduced a template for formulating an integrated country plan for the prevention and management of pandemics.

416. The briefing covered the need for important supportive action, financial assistance and identifying the critical factors required for achieving results in controlling avian influenza. The need for comprehensive in-country, intercountry and inter-agency coordination networks was highlighted. The Commission expressed appreciation of the presentation and commented on issues related to the development of vaccines and diagnostics, as well as on the difficulty of enforcing biosecurity in countries with large numbers of small-scale and backyard farmers.

Chapter IV

RESOLUTIONS AND OTHER DECISIONS ADOPTED BY THE COMMISSION AT ITS SIXTY-SECOND SESSION

A. Resolutions

62/1. Achieving the Millennium Development Goals in the ESCAP region¹

*The Economic and Social Commission for Asia
and the Pacific,*

Recalling General Assembly resolution 55/2 of
8 September 2000 on the United Nations Millennium
Declaration,

Recalling also General Assembly resolution
60/1 of 16 September 2005 on the 2005 World Summit
Outcome, in which the Heads of State and Government
strongly reiterated their determination to ensure the
timely and full realization of the development goals
and objectives agreed at the major United Nations
conferences and summits, including those agreed at the
Millennium Summit, described as the Millennium
Development Goals, which have helped to galvanize
efforts towards poverty eradication,

Bearing in mind the Johannesburg Plan of
Implementation of the World Summit on Sustainable
Development and the Monterrey Consensus of
the International Conference on Financing for
Development,

Recalling its resolution 60/1 of 28 April 2004
on the Shanghai Declaration, in which it welcomed the
achievements of the region in economic and social
development, including progress made in achieving the
internationally agreed development goals, including
those contained in the Millennium Declaration and the
outcomes and final documents of major United
Nations summits and international conferences,

Recalling also the Jakarta Declaration on
Millennium Development Goals in Asia and the
Pacific: The Way Forward 2015, adopted on 5 August
2005 at the Regional Ministerial Meeting on the
Millennium Development Goals in Asia and the
Pacific: The Way Forward 2015,

Taking note of document E/ESCAP/1363 on
the implementation of the Jakarta Declaration on
Millennium Development Goals in Asia and the
Pacific: The Way Forward 2015 and document
E/ESCAP/1382 on implications of the 2005 World
Summit Outcome for the work of ESCAP,

Noting the Declaration on the New Asian
African Strategic Partnership adopted by the Asian and
African Heads of State and Government at the Asian-
African Summit, held in Jakarta in April 2005, as well

as the Joint Ministerial Statement on the New Asian-
African Strategic Partnership Plan of Action, which
could play an important role in enhancing solidarity and
interregional cooperation,

Welcoming the holding of the High-Level
Forum on the Health Millennium Development Goals
in Asia and the Pacific in Tokyo on 21 and 22 June
2005 and the initiative of the Government of Japan to
host the Fourth Japan-Pacific Islands Forum Summit
Meeting in Okinawa, Japan, in May 2006, and aware
that, at the previous Japan-Pacific Islands Forum
Summit Meeting, the Okinawa Initiative: Regional
Development Strategy for a More Prosperous and
Safer Pacific and the Joint Action Plan were adopted
to translate the Millennium Development Goals, and
other principles and commitments, into regional
initiatives,

Recalling the Shanghai Agenda on Poverty
Reduction, adopted at the Global Conference on Scaling
up Poverty Reduction, held in Shanghai in May 2004,
and recognizing that the establishment of the China
International Poverty Reduction Center aims to facilitate
the exchange and spread of experiences and lessons on
poverty reduction in the region and worldwide,

Recognizing that the Asian and Pacific region
contains two thirds of the world's over one billion poor
and that strong political will and bold and decisive
actions are therefore needed for achieving poverty
eradication through sustainable economic growth, while
committing to make poverty reduction an overarching
objective of developmental partnership and cooperation
in Asia and the Pacific,

Welcoming the efforts made by countries, and
the progress made in the region, particularly by
developing countries, in achieving the internationally
agreed development goals, including the Millennium
Development Goals and the outcomes and final
documents of major United Nations summits and
international conferences, but concerned about the
slow and uneven progress towards achieving health
and environment-related goals, and the uneven
progress in education-related goals,

Also welcoming the contribution of some
countries in the region to the global partnership for
development, especially for the immediate problems of
developing countries and the special needs of least
developed countries, through various measures,
including South-South cooperation, and in that regard,
welcoming further the increased resources that will
become available as a result of the establishment of
timetables by many developed countries to achieve the
target of 0.7 per cent of gross national product for

¹ See paragraphs 124 to 144 above.

official development assistance by 2015, and inviting those developed countries that have not yet done so to make concrete efforts in this regard in accordance with their commitments.

Reaffirming that each country must take primary responsibility for its own development and that the role of national policies and development strategies cannot be overemphasized and, in that regard, welcoming efforts by countries in the region to promote good governance, foster a dynamic and well-functioning business sector, fight corruption, pursue sound macroeconomic policies and develop efficient, transparent, and accountable systems for mobilizing public resources and managing their use and inviting all Governments that have not yet done so to make concrete efforts in this regard in accordance with their commitments,

Recognizing that national efforts should be complemented by supportive global programmes, measures and policies aimed at expanding the development opportunities of developing countries, while taking into account national conditions and ensuring respect for national ownership, strategies and sovereignty,

Recognizing also the importance of regional partnership and cooperation in the achievement of the Millennium Development Goals, and also the necessity to assist upon request those countries in need in achieving the Millennium Development Goals,

Welcoming the support provided by the various development partners, including the international financial institutions, donor countries and organizations, the private sector and civil society in achieving the Millennium Development Goals,

Recognizing the central role of the United Nations in development and the important role of ESCAP and the other regional commissions as forums for policy dialogue and consensus-building at the regional level on development-related issues, and aware of the role of the regional commissions to assist those member States seeking such support in achieving the outcomes of the major United Nations conferences and summits, including the Millennium Development Goals, in accordance with their respective mandates,

1. *Welcomes* the efforts of those countries which have developed their national development strategies to meet the Millennium Development Goals, and invites countries that have not yet done so to make concrete efforts in that regard in accordance with their commitments, taking into account the principle that, while individual countries have primary responsibility for their own development, a conducive international environment for development is essential;

2. *Takes note with appreciation* of the regional partnership on the Millennium Development Goals between ESCAP, the United Nations

Development Programme and the Asian Development Bank, which provides a consolidated regional platform to support the achievement of the Goals, as well as a series of reports published by ESCAP, the United Nations Development Programme and the Asian Development Bank which assess progress towards achieving the Goals in Asia and the Pacific; including the report on the Millennium Development Goals in the least developed countries of Asia and the Pacific;

3. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) Within its mandate, to strengthen regional policy dialogue for development, including on technical assistance and capacity-building, in cooperation with other bodies of the United Nations system, including the United Nations Conference on Trade and Development and the United Nations Development Programme, and relevant international organizations, including the World Trade Organization, the World Bank, the International Monetary Fund and the Asian Development Bank, within their respective mandates and competence, in a coherent manner, with a view to developing appropriate ways and means to expedite achievement of the Millennium Development Goals in the ESCAP region, including by addressing pressing economic and social issues;

(b) To continue to assist, within the mandate of ESCAP and in close coordination with other entities of the United Nations system and other relevant international organizations, the members and, as appropriate, associate members in their efforts to achieve the Millennium Development Goals through, inter alia, carrying out capacity-building and technical cooperation activities;

(c) To increase the effectiveness of the regional advisory services and regional subsidiary bodies of ESCAP in assisting member countries in achieving the Millennium Development Goals and sustainable development;

(d) To continue to assess progress towards achieving the Millennium Development Goals in Asia and the Pacific in cooperation with relevant international organizations, such as the United Nations Development Programme and the Asian Development Bank, and to transmit a progress assessment to the Economic and Social Council, and especially to its annual ministerial-level substantive reviews, for consideration;

(e) To develop recommendations for achievement of the Millennium Development Goals by 2015 in the form of a regional road map, by developing and refining existing elements, and building also on related efforts or processes;

4. *Decides* to include in the provisional agenda of its sixty-third session an item entitled

"Achieving the Millennium Development Goals in the ESCAP region" and requests the Executive Secretary to submit a report on the implementation of the present resolution.

5th meeting
12 April 2006

62/2. Jakarta Declaration on enhancing regional cooperation in infrastructure development, including that related to disaster management²

The Economic and Social Commission for Asia and the Pacific,

Expressing deep appreciation to the Government and citizens of Indonesia for hosting the present session in Jakarta,

Recalling General Assembly resolutions 55/2 of 8 September 2000 on the United Nations Millennium Declaration and 60/1 of 16 September 2005 on the 2005 World Summit Outcome, which calls for timely and full realization of the development goals and objectives agreed at the major United Nations conferences and summits, including the Millennium Development Goals, and recalling also the Monterrey Consensus,

Recalling also the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, which was adopted at the World Conference on Disaster Reduction, held in Kobe, Japan, from 18 to 22 January 2005,

Recognizing that infrastructure is a key element for realizing sustained economic growth and sustainable development to achieve the Millennium Development Goals,

Recognizing also the need to undertake infrastructure development that provides high economic and social benefits and improves the quality of life of people, particularly the poor, and those in rural and remote areas,

Recognizing further the region's high vulnerability to natural disasters that can hamper progress in infrastructure development and poverty reduction,

Welcoming the increased emphasis of the World Bank and the Asian Development Bank on infrastructure critical to growth, and their increased efforts to catalyse private-sector investment and public-private partnerships,

Recalling the deliberations of the Commission at its sixty-first session, held in Bangkok in May 2005, which focused on financing for development, and underscoring the need to follow up its outcomes through strengthened and concrete regional cooperation on

infrastructure development, including that related to disaster management,

Recalling also the Jakarta Declaration on Millennium Development Goals in Asia and the Pacific: The Way Forward 2015, which calls for the promotion of affordable and environmentally sustainable infrastructure that targets the needs of the poor,

Recalling further the Bali Ministerial Joint Statement on Infrastructure Development in the Asia-Pacific Region, adopted at the Ministers' Forum on Infrastructure in the Asia-Pacific Region, held in Bali, Indonesia, in October 2003,

Recognizing the need for a particular focus on the development of infrastructure in areas affected by natural disasters,

Welcoming resolution XXIII-12 of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization of 16 April 2005, establishing the Indian Ocean Tsunami Warning and Mitigation System, and the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System,

Underlining the strategic role of infrastructure development for improving interconnectedness and cooperation between and within countries and promoting democratic processes and empowerment,

Recognizing that diverse geographic and demographic conditions, different stages of development and existing gaps in infrastructure development within and between countries in the region pose serious challenges for some countries in achieving the Millennium Development Goals,

Recognizing also the importance of greater infrastructure development in Asia and the Pacific and acknowledging the crucial role that sound economic, regulatory and good governance policies at all levels can play in fostering the positive investment climate necessary to mobilize public and private resources for financing this development,

Recognizing further that cooperation and mobilization of resources at national, regional and international levels can play a critical role in infrastructure development,

1. Invites members and, as appropriate, associate members:

(a) To formulate and implement policies for infrastructure development aimed at improving the quality of life, that take into account the need to provide high economic and social benefit to poor people and people living in rural and remote areas;

(b) To endeavour to enhance the efficiency and quality of infrastructure facilities and services;

(c) To implement good public and corporate governance principles throughout the process of infrastructure development, through, inter alia, the provision of conducive and transparent legal

² See paragraphs 94 to 123 above.

frameworks for private sector involvement, and the establishment and use of appropriate systems of public procurement, based on transparency, competition and objective and predetermined criteria in decision-making that are effective in preventing corruption, without prejudice to the positions of members on these issues in other forums;

(d) To create an enabling environment for the promotion of public-private partnerships at the national and regional levels, for active and constructive participation of the private sector in infrastructure, and for the enhanced active participation of all relevant stakeholders in infrastructure development;

(e) To develop infrastructure development policies and strategies, taking into account safety and environmental concerns as well as geographic characteristics;

(f) To promote national and regional efforts to increase and sustain public and private resources for infrastructure development based on sustainable development principles;

(g) To strengthen national and regional preparedness in disaster risk management and response capability through education, training and the sharing of expertise, information and best practices, including through the United Nations "White Helmets Initiative";

(h) To strengthen regional cooperation on infrastructure development by improving the effectiveness of existing regional and subregional initiatives in this field;

(i) To examine and promote the use of microfinance for infrastructure development;

2. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To promote appropriate instruments and modalities for enhancing regional cooperation in infrastructure development through, inter alia, capacity-building, technical cooperation activities and the promotion of the interoperability, interconnectedness and intermodality components of infrastructure development, including maritime infrastructure, as appropriate;

(b) To forge closer cooperation with United Nations bodies, development agencies and multilateral financing institutions, as well as donors, as appropriate within their respective mandates, to strengthen global partnerships for infrastructure development, including that related to disaster risk management, reconstruction and rehabilitation;

(c) To assist members and, as appropriate, associate members with developing policy responses to promote renewable and environmentally friendly energy sources, energy efficiency and related infrastructure;

(d) To continue efforts to ascertain the views of the member States to identify and address the investment needs and priorities of members, and, as appropriate, of associate members, in infrastructure development, including that which contributes towards the integration of regional infrastructure;

(e) To report to the Commission at its sixty-fourth session on the implementation of the present Declaration.

*5th meeting
12 April 2006*

62/3. Implementation of the Plan of Action for Sustainable Tourism Development in Asia and the Pacific, phase II (2006-2012) and the Regional Action Programme for Sustainable Tourism Development³

The Economic and Social Commission for Asia and the Pacific,

Welcoming the successful outcome of the High-level Intergovernmental Meeting on Sustainable Tourism Development, held in Bali, Indonesia, in December 2005, which adopted the Bali Declaration on Sustainable Tourism Development and the Plan of Action for Sustainable Tourism Development in Asia and the Pacific, phase II (2006-2012) including its Regional Action Programme for Sustainable Tourism Development (2006-2012),

Stressing the enormous potential of sustainable tourism for socio-economic development and poverty eradication, including as a main source of foreign exchange earnings and employment generation in both urban and rural areas across the region,

Noting that the international community is attaching special importance to tourism as reflected in a number of global initiatives, including the Johannesburg Plan of Implementation, 2002, the Brussels Declaration and the Programme of Action for the Least Developed Countries for the Decade 2001-2010, the Global Code of Ethics on Tourism adopted at the thirteenth session of the General Assembly of the World Tourism Organization, and the Yogyakarta Declaration on Cultural Tourism, Local Communities and Poverty Alleviation of 9 February 2006 adopted at the World Tourism Organization International Conference on Cultural Tourism and Local Communities, held in Yogyakarta, Indonesia, from 8 to 10 February 2006,

Emphasizing that tourism, based on the principle of sustainable development, is an important means to manage environmental and cultural concerns effectively while contributing to economic growth and promoting social development,

³ See paragraphs 200 to 203 above.

Recognizing the significant contribution of sustainable tourism development to the achievement of the Millennium Development Goals, especially those relating to poverty reduction, gender equality and empowerment of women, environmental conservation, global partnerships for development and the special needs of least developed countries, landlocked developing countries and small island developing States,

Acknowledging the satisfactory implementation of and lessons learned from the first phase of the Plan of Action for Sustainable Tourism Development in the Asian and Pacific Region (1999-2005),

Emphasizing the importance of tourism in socio-economic development, particularly in rural areas,

Recognizing the need to further facilitate and guide the contribution of tourism to socio-economic development and to take specific action at the national and regional levels,

1. *Invites* all members and, as appropriate, associate members in the region:

(a) To participate actively in the implementation of the Bali Declaration and the Plan of Action (phase II), including the Regional Action Programme;

(b) To identify areas for action to further enhance the contribution of tourism to socio-economic development and poverty reduction using the Bali Declaration and the Plan of Action as guidelines, in accordance with the economic and social conditions prevailing in the countries of the region;

(c) To consider appointing, as appropriate, a focal point responsible for coordinating the implementation of the Plan of Action at the national level;

(d) To take measures to minimize the adverse socio-cultural and environmental impacts of tourism, including the prevention of all forms of exploitation of women and children as well as the promotion of green tourism and preservation of cultural heritage by, among other measures, promoting an adequate regulatory framework;

(e) To consider measures to promote the Global Code of Ethics on Tourism of the World Tourism Organization;

(f) To support tourism-related local economic activities, including the promotion of access to capital through microfinancing and marketing schemes for micro and small enterprises;

(g) To promote women's empowerment and participation in tourism by facilitating their access to financing schemes, including enterprise grants and loans;

2. *Invites* all United Nations bodies, the World Tourism Organization and other specialized

agencies concerned, multilateral and regional financial institutions, donor countries and agencies, as well as non-governmental organizations and the private sector, to provide technical and/or financial support for the implementation of the Plan of Action, including its Regional Action Programme,

3. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To continue to accord priority to the secretariat's activities in the area of tourism;

(b) To take effective measures to encourage the implementation of the Regional Action Programme, the text of which is attached as an annex to the present resolution;

(c) To prepare and conduct a regional study on the role of tourism in socio-economic development, including a common approach to the monitoring of the implementation of the Plan, for submission to and consideration by the Commission at its sixty-third session, in 2007;

(d) To document and disseminate case studies and good practices, such as rural tourism, in utilizing tourism as an entry point to the poverty reduction process;

(e) To undertake activities described in the Regional Action Programme in the following five thematic areas: (i) enhancement of the role of tourism in socio-economic development and poverty reduction; (ii) facilitation of travel and the development of transport and other tourism-related infrastructure; (iii) sociocultural and environmental management of tourism; (iv) crisis and risk management in tourism; and (v) human resources development in the tourism sector;

(f) To promote regional cooperation and support subregional initiatives in the tourism sector, in particular regional networking arrangements through the Network of Asia-Pacific Education and Training Institutes in Tourism;

(g) To continue cooperation with the World Tourism Organization and other relevant organizations in implementing the above activities;

(h) To promote the participation of national experts from members and, as appropriate, associate members in ESCAP technical cooperation activities;

(i) To make efforts to enhance regional cooperation and the capacity of members and, as appropriate, associate members in promoting tourist safety, security and comfort;

(j) To report to the Commission at its sixty-fourth session on the implementation of the Plan of Action.

5th meeting
12 April 2006

REGIONAL ACTION PROGRAMME FOR SUSTAINABLE TOURISM DEVELOPMENT (2006-2012)

The Regional Action Programme has been developed to provide support and to complement the efforts exerted at the national level within the framework of the Plan of Action for Sustainable Tourism Development in Asia and the Pacific, phase II (2006-2012). The Programme is structured around the five theme areas of the Plan, namely: (a) enhancing the role of tourism in socio-economic development and poverty reduction; (b) facilitation of travel and development of transport and other tourism-related infrastructure; (c) the sociocultural and environmental management of tourism; (d) crisis and risk management in tourism; and (e) human resources development in the tourism sector.

The Programme has been designed to be "results-oriented" and as such is broadly based upon a logical framework or "logframe". Within each subprogramme, the headings include the objective, expected accomplishments, actions and indicators of achievement. The "actions" relate to the specific actions, activities or outputs of the organizations supporting the implementation of the second phase of the Plan of Action. The "expected accomplishments" relate to the capacities built, knowledge imparted, skills improved and networks developed by, and within the "manageable interest" of, the organizations, and the "objectives" relate to what the principal stakeholders do with the increased capacities, knowledge, skills and networks. The "indicators of achievement" are those of the organizations.

All concerned United Nations agencies, international and regional organizations, development assistance agencies and non-governmental and other organizations involved in tourism are invited to contribute to the implementation of the Regional Action Programme. It is recognized that in order for the Programme to be effective, coordination and cooperation are necessary among these agencies and organizations. In this respect, they are encouraged to convene ad hoc inter-agency meetings in association with other tourism-related meetings to discuss regional concerns about issues relating to sustainable tourism development and to keep implementation of the Programme under review. Such inter-agency meetings would also provide the opportunity to refine the Regional Action Programme as required, so that planned activities and outputs remain relevant to the priority needs of the countries.

Theme 1. Enhancing the role of tourism in socio-economic development and poverty reduction

Introduction

Tourism plays a significant role in socio-economic development, poverty reduction and

achievement of the Millennium Development Goals. This role can be enhanced considerably through increased understanding of the linkages between tourism, development and poverty reduction, the introduction or improvement of the policy environment for the sector, and the implementation of appropriate tourism programmes and projects.

Objective

To enhance the role of tourism in socio-economic development and poverty reduction.

Expected accomplishment

An increase in (a) understanding of the linkages between tourism development and poverty reduction, (b) the capacity to improve the policy environment for the sector, and (c) the capacity to implement appropriate tourism programmes and projects of policymakers and other stakeholders.

Actions

- (1) Analytical studies on linkages and transmission mechanisms between mainstream tourism and poverty reduction as well as targeted interventions and poverty reduction.
- (2) Identification of the contribution of tourism to the achievement of the Millennium Development Goals and its targets.
- (3) Development of indicators and guidelines on measuring the contribution of tourism to poverty reduction.
- (4) Documentation of case studies and good practices in utilizing tourism as an entry point to the poverty reduction process.
- (5) Dissemination of the principal outcomes of the above studies, indicators and guidelines through publications and the Internet, policy advocacy and dialogue, knowledge networking, and training and advisory services.
- (6) Facilitation of subregional initiatives in also promoting neighbouring countries as single tourism destinations.
- (7) Promotion of poverty-oriented tourism along major transport corridors, including the Asian Highway, and railway tourism, especially along the Trans-Asian Railway. These actions would be focused on providing a geographical spread of employment, especially to rural and remote areas located far from the main centres of economic

activity where there may be limited alternatives for economic development, for example, highway service centres, community-based road stations, such as *dhabas* and *michi-no-eki* and highway oases.

- (8) Capacity-building activities, including forums in which to share experience and good practices in enhancing the contribution of tourism to the achievement of the Millennium Development Goals.

Indicator of achievement

Countries initiating tourism programmes and projects that can contribute effectively to overall socio-economic development and poverty reduction.

Theme 2. Facilitation of travel and development of other tourism-related infrastructure

Introduction

The provision of safe, convenient and economical transport and other tourism-related infrastructure is a key factor for the success of tourism. For many countries in Asia and the Pacific, inadequate infrastructure is a significant constraint on tourism development. Infrastructure that does not cater adequately for the needs of people with disabilities, including infants and the elderly, excludes many destinations from this promising market. Procedures for the issuance of visas as well as other border-crossing issues also have a direct impact on the number of tourist arrivals. In order to further expand tourism, countries need to provide adequate infrastructure to support tourism development and make procedures for the issuance of visas and border formalities easier and more efficient.

Objectives

- (1) To improve procedures for the issuance of visas, border-crossing and customs and security formalities.
- (2) To enhance countries' capabilities to facilitate travel through the coordinated development of tourism-related infrastructure.
- (3) To improve access to tourism-related activities for people with disabilities.
- (4) To develop physical infrastructure for the joint benefit of tourists, travellers and local communities.

Expected accomplishment

An increased awareness of policymakers of the physical and non-physical barriers to travel and tourism and development of policies to remove such barriers; an increased capacity to develop tourism-related physical infrastructure; and improved physical infrastructure for local communities.

Actions

- (1) Identification of areas of improvement for visa requirements and border-crossing formalities for tourists and travellers.
- (2) Guidelines and documentation of good practices on the facilitation of the cross-border movements of tourists, including the application of information technologies.
- (3) The identification of regional transport infrastructure and service improvements that could provide improved access for travellers and tourists.
- (4) Guidelines and case studies on the development of physical infrastructure for the joint benefit of tourists, travellers and local communities.
- (5) Promotion of barrier-free tourism for people with disabilities.
- (6) Dissemination of the principal outcomes and capacity-building activities related to the above actions.

Indicators of achievement

- (1) Countries initiating projects to develop tourism-related infrastructure.
- (2) Countries initiating measures to improve facilities for barrier-free tourism for people with disabilities.
- (3) Countries adopting simplified procedures for the issuance of visas, border formalities and customs regulations.

Theme 3. Sociocultural and environmental management of tourism

Introduction

While tourism can be a useful tool for the conservation of the natural environment and the preservation of cultural heritage, if not managed properly it can have adverse sociocultural and environmental impacts. In this context, there is a crucial need to enhance the capabilities of countries to minimize the adverse impacts of tourism while expanding its positive role in development.

Objective

To strengthen the capabilities of countries to manage the sociocultural and environmental impacts of tourism and enhance its positive role in development.

Expected accomplishment

An increased capacity to implement programmes which can manage the adverse

sociocultural and environmental impacts of tourism effectively and enhance its positive role in development.

Actions

- (1) Promotion of tourism as a means of creating "markets" for public goods such as biodiversity, the environment, the natural and built heritage, and culture.
- (2) Investigation of means of financing environmental protection and the preservation of the cultural heritage in tourism destinations, including the channelling of government and private sector revenues from tourism to such protection and preservation.
- (3) Promotion of sustainable and efficient use of energy and water resources in the tourism industry.
- (4) Promotion of public-private partnerships in the sociocultural and environmental management of tourism.
- (5) Promotion of corporate social responsibilities and codes of practice in the tourism sector.
- (6) Dissemination of principal outcomes and capacity-building activities related to the above actions.

Indicator of achievement

Countries integrating sociocultural and environmental considerations into tourism planning and development and initiating programmes aimed at managing the adverse impacts of tourism on the natural environment, culture and civil society and enhancing its positive role.

Theme 4. Crisis and risk management in tourism

Introduction

In recent years, the tourism industry has been severely affected by violent incidents, health-related crises and natural disasters. These incidents have had an enormous impact on tourism, creating widespread fear and uncertainty among potential travellers. Many countries in Asia and the Pacific have suffered a sharp drop in tourist arrivals with the resultant loss of tourism-related jobs and a decline in foreign exchange earnings. There is an urgent need to strengthen the capability of countries to manage crises and risks that affect the tourism industry as well as those employed directly and indirectly in the industry.

Objective

To enhance the capability of countries to manage the crises and risks that affect the tourism industry and those employed directly and indirectly in the industry.

Expected accomplishment

An increased capacity to implement effective measures to manage the crises and risks that affect tourism and those employed directly and indirectly in the industry.

Actions

- (1) Review and refinement of guidelines and manuals on crisis and risk management in the tourism industry.
- (2) Documentation of case studies and good practices on crisis and risk management in the tourism industry.
- (3) Analytical and case studies on minimizing the employment and income generation risks to poorer sectors of the community that are associated with tourism.
- (4) Dissemination of principal outcomes and capacity-building activities related to the above actions.
- (5) Close cooperation, nationally, regionally and internationally, in managing crises and risks that affect the tourism industry.

Indicators of achievement

- (1) Government tourism agencies and tourism enterprises initiating systematic crisis management measures, including preparation of a crisis management plan, strengthening safety measures and training.
- (2) Countries taking specific action to assist in the management of risks faced by those employed directly or indirectly in the tourism industry.

Theme 5. Human resources development in the tourism sector through regional networking

Introduction

The availability of skilled and trained manpower is a crucial element in the successful long-term development and sustainability of a tourism destination. The need to develop the required human resources in various segments of the tourism industry has become urgent as a consequence of the rapid growth in tourism. Some of the constraints and problems related to human resources development can be tackled more effectively through closer cooperation among the countries of the region, since individual countries possess certain strengths and expertise that can be usefully shared with other countries.

Objective

To promote regional cooperation in human resources development in the tourism sector.

Expected accomplishment

An increase in cooperation among countries in the region in human resources development in the tourism sector through APETIT.

Actions

- (1) Dissemination of information on tourism education and training through the APETIT website and newsletter and preparation of (a) a directory of APETIT expertise, (b) a directory of student and staff exchange, (c) an inventory of research priorities and (d) an inventory of scholarships offered by APETIT member institutes.
- (2) Training of (a) government tourism officials, (b) lecturers/trainers in tourism education/training institutes and (c) employees in the tourism industry and advisory services utilizing expertise available in APETIT member institutes.
- (3) Forums to consider specific issues related to human resources development in the tourism sector.

Indicators of achievement

- (1) Increased membership in APETIT.
- (2) Countries participating in the cooperation activities of APETIT.

62/4. Intergovernmental Agreement on the Trans-Asian Railway Network⁴

The Economic and Social Commission for Asia and the Pacific,

Recognizing the vital role of transport in sustaining and promoting economic and social development and regional integration in the era of globalization,

Recognizing also the role of railway transport as an important component of the integrated, international, intermodal transport network, as envisioned in the Seoul Declaration on Infrastructure Development in Asia and the Pacific, adopted by the Ministerial Conference on Infrastructure, held in Seoul from 12 to 17 November 2001, to ensure the smooth movement of people and goods in the region and between Asia and Europe for the development of the region's economy, trade and tourism,

Recalling the recommendation of that Ministerial Conference, as endorsed by the Commission at its fifty-eighth session, to develop an intergovernmental agreement on the Trans-Asian Railway

network, and the preparation of a draft agreement at a regional meeting held in Bangkok on 22 and 23 November 2004, and subsequent negotiations on the draft agreement through a series of subregional expert group meetings on the Trans-Asian Railway,

Emphasizing the importance of full, timely and effective implementation of the Almaty Programme of Action: Addressing the Special Needs of Landlocked Developing Countries within a New Global Framework for Transit Transport Cooperation for Landlocked and Transit Developing Countries, which was adopted at the International Ministerial Conference of Landlocked and Transit Developing Countries and Donor Countries and International Financial and Development Institutions on Transit Transport Cooperation, held in Almaty, Kazakhstan, on 28 and 29 August 2003, and acknowledging that the Trans-Asian Railway network, along with the Asian Highway network, provides transit transport opportunities,

Appreciating the commitment of member countries to coordinated development of the regional transport network as demonstrated through the rapid entry into force of the Intergovernmental Agreement on the Asian Highway Network on 4 July 2005, bearing in mind that the Asian Highway and Trans-Asian Railway networks could provide an important contribution to the integrated international intermodal transport network,

Appreciating also the active participation of ESCAP members and railway organizations, in close collaboration with international organizations, in the successful development of the Trans-Asian Railway network and the implementation of demonstration runs of container block-trains along its northern corridor,

Noting the important progress achieved concerning the development, formalization and operationalization of the Trans-Asian Railway during the course of three meetings held in Moscow from 26 to 30 September 2005,

Welcoming the finalization of the draft intergovernmental agreement on the Trans-Asian Railway network by the Intergovernmental Meeting for Developing the Intergovernmental Agreement on the Trans-Asian Railway Network, held in Bangkok from 28 to 30 November 2005,

Bearing in mind the implementation schedule of the draft intergovernmental agreement on the Trans-Asian Railway network, as endorsed by the Commission at its sixty-first session, proposing its adoption at the sixty-second session, in April 2006, with a view to a formal signing ceremony being organized at the Ministerial Conference on Transport to be held later in 2006,

Expressing its appreciation to the Government of the Republic of Korea for its valuable support in the development and operationalization of the Trans-Asian Railway network and the support provided in the preparation for, and convening of, the Intergovernmental Meeting,

⁴ See paragraphs 191 to 196 above.

Expressing its appreciation to the Government of Indonesia for hosting the sixty-second session of the Commission in April 2006, during which the special session on the draft intergovernmental agreement on the Trans-Asian Railway network is being organized,

Welcoming the proposal of the Government of the Republic of Korea to host the signing ceremony for the agreement during the Ministerial Conference on Transport in Busan, Republic of Korea, which will be held from 6 to 11 November 2006,

Convinced that the Intergovernmental Agreement on the Trans-Asian Railway Network will strengthen regional cooperation among member countries to promote international trade, tourism and economic development through coordinated development of the transport network and have a substantial positive impact on the region by helping to achieve the internationally agreed development goals, including those contained in the United Nations Millennium Declaration, adopted by the General Assembly in its resolution 55/2 of 8 September 2000,

1. *Adopts* the Intergovernmental Agreement on the Trans-Asian Railway Network, the text of which is contained in the annex to the present resolution;

2. *Invites* all relevant members of the Economic and Social Commission for Asia and the Pacific to become parties to the Intergovernmental Agreement on the Trans-Asian Railway Network in order to ensure its rapid entry into force;

3. *Invites* the international and regional financing institutions and multilateral and bilateral donors to consider providing further financial and technical support for the development and operationalization of the Trans-Asian Railway network;

4. *Invites* international organizations to continue to collaborate with members of ESCAP to promote the development and operationalization of the Trans-Asian Railway network;

5. *Encourages* landlocked developing countries and their transit neighbours to work together to enable the Trans-Asian Railway and Asian Highway networks to provide further tangible transit transport opportunities within the scope of the Almaty Programme of Action;

6. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To facilitate member countries in the process of becoming parties to the Agreement;

(b) To accord priority to the development of the Trans-Asian Railway within the ESCAP programme of work;

(c) To collaborate effectively with international and regional financing institutions, multilateral and bilateral donors and international

organizations for the development and operationalization of the Trans-Asian Railway network;

(d) To continue to work towards the development of an integrated, international, intermodal transport network in Asia, including through the development of appropriate intermodal facilities and through the planning and implementation of demonstration runs of container block-trains on other corridors of the Trans-Asian Railway network, as appropriate;

(e) To continue to work towards the development of an integrated Euro-Asian transport system, in cooperation with the Economic Commission for Europe and other interested organizations, as appropriate;

(f) To discharge effectively the functions of the secretariat of the Agreement;

(g) To report to the Commission at its sixty-fourth session on the implementation of the present resolution.

*5th meeting
12 April 2006*

Annex

INTERGOVERNMENTAL AGREEMENT ON THE TRANS-ASIAN RAILWAY NETWORK

THE CONTRACTING PARTIES,

CONSCIOUS of the need to promote and develop international rail transport in Asia and with neighbouring regions,

AWARE of the expected increase in the international transport of people and goods as a consequence of growing international trade in the ongoing process of globalization,

RECALLING the cooperation among members of the United Nations Economic and Social Commission for Asia and the Pacific in the formulation and operationalization of the Trans-Asian Railway Network,

CONSIDERING that in order to strengthen relations and promote international trade and tourism among members of the United Nations Economic and Social Commission for Asia and the Pacific, it is essential to develop the Trans-Asian Railway Network, including stations and container terminals of international importance, to the requirements of international transport and the environment,

KEEPING also in view the role of railway transport as an important component of an effective and efficient international intermodal transport network, especially in addressing the specific needs of landlocked and transit countries,

HAVE AGREED as follows:

Article 1

Definition of Railway Lines of International Importance

For the purposes of the Intergovernmental Agreement on the Trans-Asian Railway Network (the "Agreement"), the term "railway lines of international importance" as described in Annex I shall refer to:

- a) railway lines currently used for regular international transport;
- b) railway lines, either existing, under construction, or planned, that are intended to be used for regular international transport;
- c) ferry links ensuring continuous transport across seas or lakes between terminals in different States or within one State;
- d) border crossing points, gauge interchange stations, ferry terminals and rail-connected container terminals where Customs clearance facilities/services are provided.

Article 2

Adoption of the Trans-Asian Railway Network

The Contracting Parties (the "Parties") hereto adopt the railway lines of international importance described in Annex I to the Agreement as a coordinated plan for the development of railway lines of international importance which they intend to be undertaken within the framework of the national programmes of the Parties.

Article 3

Development of the Trans-Asian Railway Network

The lines of the Trans-Asian Railway Network should be brought into conformity with the guiding principles related to technical characteristics described in Annex II to the Agreement.

Article 4

Procedure for signing and becoming a Party

1. The Agreement shall be open for signature by States which are members of the United Nations Economic and Social Commission for Asia and the Pacific at Busan, Republic of Korea, on 10 and 11 November 2006, and thereafter at the United Nations Headquarters in New York from 16 November 2006 to 31 December 2008.
2. Those States may become Parties to the Agreement by:
 - a) Signature subject to ratification, acceptance or approval, followed by ratification, acceptance or approval; or

- b) Accession.

3. Ratification, acceptance, approval or accession shall be effected by the deposit of an instrument in good and due form with the Secretary-General of the United Nations.

Article 5

Entry into force

1. The Agreement shall enter into force on the ninetieth day following the date on which the Governments of at least eight (8) States have consented to be bound by the Agreement pursuant to Article 4, paragraph 2 and 3.
2. For each State which deposits its instrument of ratification, acceptance, approval or accession after the date upon which the conditions for the entry into force of the Agreement have been met, the Agreement shall enter into force for that State ninety (90) days after the date of its deposit of the said instrument.

Article 6

Working Group on the Trans-Asian Railway Network

1. A Working Group on the Trans-Asian Railway Network (the "Working Group") shall be established by the United Nations Economic and Social Commission for Asia and the Pacific to consider the implementation of the Agreement and to consider any amendments proposed. All States which are members of the United Nations Economic and Social Commission for Asia and the Pacific shall be members of the Working Group.

2. The Working Group shall meet biennially. Any Party may also, by a notification addressed to the secretariat, request that a special meeting of the Working Group be convened. The secretariat shall notify all members of the Working Group of the request and shall convene a special meeting of the Working Group if not less than one third of the Parties signify their assent to the request within a period of four (4) months from the date of the notification by the secretariat.

Article 7

Procedures for amending the main text

1. The main text of the Agreement may be amended by the procedure specified in this Article.
2. Amendments to the Agreement may be proposed by any Party.
3. The text of any proposed amendment shall be circulated to all members of the Working Group by the secretariat at least forty-five (45) days before the Working Group meeting at which it is proposed for adoption.

4. An amendment shall be adopted by the Working Group by a two-thirds majority of the Parties present and voting. The amendment as adopted shall be communicated by the secretariat to the Secretary-General of the United Nations, who shall circulate it to all Parties for acceptance.

5. An amendment adopted in accordance with paragraph 4 of the present Article shall enter into force twelve (12) months after it has been accepted by two-thirds of the Parties. The amendment shall enter into force with respect to all Parties except those which, before it enters into force, declare that they do not accept the amendment. Any Party that has declared that it does not accept an amendment adopted in accordance with this paragraph may at any time thereafter deposit an instrument of acceptance of such amendment with the Secretary-General of the United Nations. The amendment shall enter into force for that State twelve (12) months after the date of deposit of the said instrument.

Article 8

Procedures for amending annex I

1. Annex I to the Agreement may be amended by the procedure specified in this Article.

2. For the purpose of Article 8, a 'directly concerned Party' is a Party in whose territory the subject of the proposed amendment is located.

3. Amendments which change a border station may be proposed only by a directly concerned Party after consulting with and obtaining the written consent of the neighbouring State which shares the border to which the subject of the amendment is connected.

4. Amendments that do not change a border station may be proposed by any directly concerned Party.

5. The text of any amendment proposed by any Party shall be circulated to all members of the Working Group by the secretariat at least forty-five (45) days before the Working Group meeting at which it is proposed for adoption.

6. An amendment shall be adopted by the Working Group by a majority of the Parties present and voting. The amendment as adopted shall be communicated by the secretariat to the Secretary-General of the United Nations, who shall circulate it to all Parties.

7. An amendment adopted in accordance with paragraph 6 of the present Article shall be deemed accepted if, during a period of six (6) months from the date of the notification, less than one third of the Parties notifies the Secretary-General of the United Nations of their objection to the amendment.

8. An amendment accepted in accordance with paragraph 7 of the present Article shall enter into force for all Parties three (3) months after the expiry of the

period of six (6) months referred to in paragraph 7 of the present Article.

Article 9

Procedures for amending annex II

1. Annex II to the Agreement may be amended by the procedure specified in this Article.

2. Amendments may be proposed by any Party.

3. The text of any proposed amendment shall be circulated to all members of the Working Group by the secretariat at least forty-five (45) days before the Working Group meeting at which it is proposed for adoption.

4. An amendment shall be adopted by the Working Group by a majority of the Parties present and voting. The amendment as adopted shall be communicated by the secretariat to the Secretary-General of the United Nations, who shall circulate it to all Parties.

5. An amendment adopted in accordance with paragraph 4 of the present Article shall be deemed accepted if during a period of six (6) months from the date of the notification, less than one third of the Parties notifies the Secretary-General of the United Nations of their objection to the amendment.

6. An amendment accepted in accordance with paragraph 5 of the present Article shall enter into force for all Parties three (3) months after the expiry of the period of six (6) months referred to in paragraph 5 of the present Article.

Article 10

Reservations

Reservations may not be made with respect to any of the provisions of the Agreement, except as provided in Article 13, paragraph 5.

Article 11

Withdrawal

Any Party may withdraw from the Agreement by written notification addressed to the Secretary-General of the United Nations. The withdrawal shall take effect twelve (12) months after the date of receipt by the Secretary-General of such notification.

Article 12

Suspension of validity

The operation of the Agreement shall be suspended if the number of Parties becomes less than eight (8) for any period of twelve (12) consecutive months. In such a situation the secretariat shall notify the Parties. The provisions of the Agreement shall again become operative if the number of Parties reaches eight (8).

Article 13

Settlement of disputes

1. Any dispute between two or more Parties which relates to the interpretation or application of the Agreement and which the Parties in dispute are unable to settle by negotiation or consultation shall be referred to conciliation if any of the Parties in dispute so requests and shall, to that end, be submitted to one or more conciliators selected by mutual agreement between the Parties in dispute. If the Parties in dispute fail to agree on the choice of conciliator or conciliators within three (3) months after the request for conciliation, any of those Parties may request the Secretary-General of the United Nations, to appoint a single independent conciliator to whom the dispute shall be submitted.
2. The recommendation of the conciliator or conciliators appointed in accordance with paragraph 1 of this Article, while not binding in character, shall become the basis of renewed consideration by the Parties in dispute.
3. By mutual agreement, the Parties in dispute may agree in advance to accept the recommendation of the conciliator or conciliators as binding.
4. Paragraphs 1, 2 and 3 of the present Article shall not be construed to exclude other measures for the settlement of disputes mutually agreed between the Parties in dispute.
5. Any State may, at the time of depositing its instrument of ratification, acceptance, approval or accession, deposit a reservation stating that it does not consider itself bound by the provisions of the present Article relating to conciliation. Other Parties shall not be bound by the provisions of the present Article relating to conciliation with respect to any Party which has deposited such a reservation.

Article 14

Limits to the application

1. Nothing in the Agreement shall be construed as preventing a Party from taking such action, compatible with the provisions of the Charter of the United Nations and limited to the exigencies of the situation, as it considers necessary for its external or internal security.
2. A Party shall make every possible effort to develop the Trans-Asian Railway Network consistent with the Agreement. However, nothing in the Agreement shall be construed as acceptance of an obligation by any Party to permit the movement of goods and passenger traffic across its territory.

Article 15

Annexes

Annexes I and II to the Agreement shall form an integral part of the Agreement.

Article 16

Secretariat

The United Nations Economic and Social Commission for Asia and the Pacific shall be designated the secretariat of the Agreement.

Article 17

Depositary

The Secretary-General of the United Nations shall be designated the depositary of the Agreement.

IN WITNESS WHEREOF, the undersigned, being duly authorized thereto, have signed the Agreement,

OPENED for signature on the tenth day of November two thousand and six at Busan, Republic of Korea, in a single copy in the Chinese, English and Russian languages, the three texts being equally authentic.

Annex I

TRANS-ASIAN RAILWAY NETWORK

The Trans-Asian Railway network consists of the railway lines of international importance indicated below.

The lines that form the basis for describing the Trans-Asian Railway network in each State are designated in bold with the origin and end stations and are then listed vertically. Lines branching off are described to the right of the junction station. Further branches are shown indented underneath this first branch. All lines are of equal importance within the Trans-Asian Railway Network.

When lines start or finish at a border point, the first or last stations on that line are preceded or followed by the indication in brackets of the name of the border station and the name of the neighbouring State directly concerned.

The names of stations that have specific functions on a line are followed by the indication of these functions in italics and brackets. Such functions include:

- (*border station*),
- (*break-of-gauge*),
- (*junction*),
- (*maritime connection*), and
- (*ferry terminals*).

Missing links are indicated in [square brackets].

Stations with container terminals to handle International Standards Organization (ISO) containers of at least 20-foot dimension in length and above are shown underlined.

LIST OF THE LINES IN THE TRANS-ASIAN RAILWAY NETWORK

ARMENIA

Ayrum – Niuvedi

(Sadakhlo, Georgia)

Ayrum (*border station*)

Gyumri (*junction*)

→ Akhuryan (*border station and break-of-gauge*) – (Dogu Kapi, Turkey)

Masis (*junction*)

→ Yerevan – Ijevan (*border station*) – (Barkhudarly, Azerbaijan)

↳ Gagarin – Martuni – [Jermuk – Kapan – Meghri (*border station*)] – (Marand, Islamic Republic of Iran)

Yeraskh (*border station*)

(Belidag – Ordubad, Azerbaijan)

Meghri

Niuvedi (*border station*)

↓ (Agbent, Azerbaijan)

AZERBAIJAN

Yalama – Beyouk Kesik

(Samur, Russian Federation)

Yalama (*border station*)

Baku (*ferry terminal*)

→ (Ferry link to Caspian sea ports in *Islamic Republic of Iran, Kazakhstan, Russian Federation and Turkmenistan*)

Alyat (*junction*)

→ Ali Bairamli (*junction*) – Astara (*border station and break-of-gauge*) – (Astara, Islamic Republic of Iran)

→ Ali Bairamli (*junction*) – Agbent (*border station*) – (Niuvedi-Meghri (*border station*), Armenia) – Orduoad – Djulfa (*border station and break-of-gauge*) – (Djulfa, Islamic Republic of Iran)

Akstafa

→ Barkhudarly (*border station*) – (Ijevan, Armenia)

Beyouk Kesik (*border station*)

↓ (Gardabani, Georgia)

BANGLADESH

Darsana - Gundum

(Gede, India)

Darsana (*border station*)

Ishurdi (*junction*)

→ Abdulpur (*junction*) - Rohanpur (*border station*) - (Singhabad, India)

↳ Abdulpur (*junction*) - Parbatipur - Birol (*border station*) -
(Radhikapur, India)

Tongi (*junction*)

→ Dhaka

Akhaura (*junction*)

→ Kulaura - Shahbazpur (*border station*) - (Mahisasan, India)

Chittagong (*maritime connection*)

Dohazari

[Gundum (*border station*)

(*border station*) Myanmar]

CAMBODIA

Poipet - Sihanoukville

(Klong Luk, Thailand)

[Poipet (*border station*)

Sisophon]

Bat Deng (*junction*)

→ [Kratie (*border station*) - (Loc Ninh province¹, Viet Nam)]

1. Exact location to be decided.

Phnom Penh (*junction*)

Sihanoukville (*maritime connection*)

CHINA

Alashankou - Lianyungang

(Dostyk, Kazakhstan)

Alashankou (*border station and break-of-gauge*)

Urumchi

Turpan (*junction*)

→ Kashi [(*border station and break-of-gauge*) - (Torugart, Kyrgyzstan)]

Lanzhou

- Baoji (junction) → Kunming (junction) – Xiangyun (junction) – Dali (junction) – [Kachang (border station and break-of-gauge) – (Myitkyina, Myanmar)]
- ↳ [Xiangyun – Jinghong (border station and break-of-gauge) – (Boten, Lao PDR)]
 - ↳ Dali (junction) – [Rueli (border station and break-of-gauge) – (Muse, Myanmar)]
- Kunming (junction) – Hekou (border station) – (Lao Cai, Viet Nam)
- Kunming (junction) – Nanning (junction) – Guangzhou (junction)
- ↳ Nanning (junction) – Hengyang (connects with Beijing-Shenzhen line)
 - ↳ Guangzhou (connects with Beijing-Shenzhen line)

Xian

- Zhengzhou (junction) → (connects with Beijing-Shenzhen line)
- Xizhou (junction) → (connects with Tianjin-Shanghai line)

↓ Lianyungang (maritime connection)

Erenhot – Dandong

(Zamyn Uud, Mongolia)

Erenhot (border station and break-of-gauge)

- Beijing (junction) → (connects with Beijing-Shenzhen line)

Tianjin (maritime connection)

- Shenyang (junction) → (connects with Manzhouli-Dalian line)

Dandong (border station)

(Sinuiju, Democratic People's Republic of Korea)

Manzhouli – Dalian

(Zabaikalsk, Russian Federation)

Manzhouli (border station and break-of-gauge)

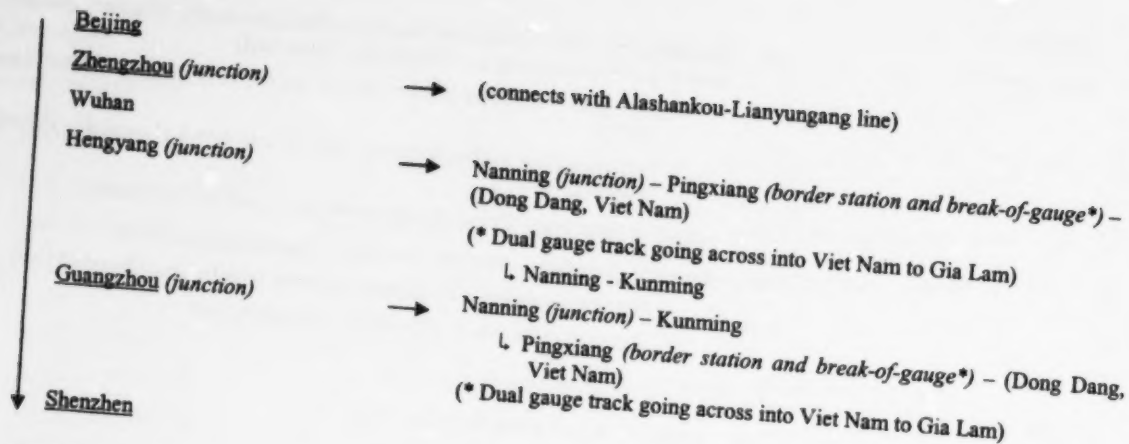
- Harbin (junction) → Suifenhe (border station and break-of-gauge) – (Grodokovo, Russian Federation)

- Changchun (junction) → Tumen (border station) – (Namyang, Democratic People's Republic of Korea)

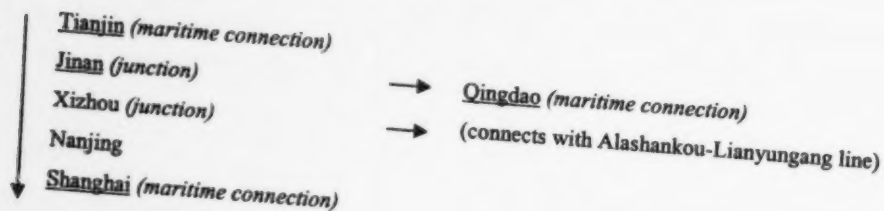
- Shenyang (junction) → (connects with Erenhot-Dandong line)

↓ Dalian (maritime connection)

Beijing - Shenzhen

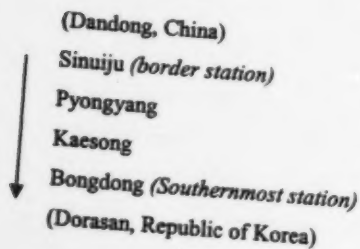


Tianjin - Shanghai



DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Sinuiju - Kaesong



Tumangang – Kumgangsán

(Khasan, Russian Federation)

↓ Tumangang (*junction, border station and break-of-gauge*) → Namyang (*border station*) – (Tumen, China)

Rajin (*junction*) → Rajin (*maritime connection*)

Chongjin (*junction*) → Namyang (*border station*) – (Tumen, China)

→ Chongjin (*maritime connection*)

Kowon

Wonsan

Haegumgang

Onjongri (*Southernmost station*)

(Jejin, Republic of Korea)

GEORGIA

Gantiadi – Gardabani

(Veseloe, Russian Federation)

Gantiadi (*border station*)

↓ Senaki (*junction*) → Poti (*maritime connection*)

Samtredia (*junction*) → Batumi (*maritime connection*)

Tbilisi (*junction*) → Sadakhlo (*border station*) – (Ayrum, Armenia)

→ [Akhalkalaki (*border station and break-of-gauge*) – (Kars, Turkey)]

Gardabani (*border station*)

(Beyouk Kesik, Azerbaijan)

INDIA

Attari – Jiribam

(Wagah, Pakistan)

Attari (*border station*)

↓ Dhandari Kalan

New Delhi (*junction*) → Mathura (*junction*) – Agra – Nagpur (*junction*) – Vijayawada (*junction*) – Chennai (*maritime connection*) – Jolarpettai (*junction*) – Madurai (*junction*) – Tuticorin (*maritime connection*)

	↳ Mathura (junction) – <u>Mumbai</u> (maritime connection)
	↳ <u>Nagpur</u> (junction) – <u>Mumbai</u> (maritime connection)
	↳ <u>Nagpur</u> (junction) – <u>Kolkata</u> (maritime connection)
	↳ Vijayawada (junction) – <u>Visakhapatnam</u> (maritime connection) – <u>Kolkata</u> (maritime connection)
	↳ Jolarpettai (junction) – <u>Mumbai</u> (maritime connection)
	↳ <u>Madurai</u> (junction) – Rameswaram (ferry terminal) – (Talaimannar, Sri Lanka)
<u>Kanpur</u> (junction)	→ Raxaul (border station) – (Birgunj, Nepal)
Mughalsarai	
Sitarampur (junction)	→ Raxaul (border station) – (Birgunj, Nepal)
<u>Kolkata</u> (junction and maritime connection)	→ <u>Haldia</u> (maritime connection)
Gede (border station)	
(Darsana, Shahbazpur, Bangladesh)	
Mahisasan (border station)	
Badarpur	
Jiribam (border station and break-of-gauge)	
[(Tamu, Myanmar)]	

INDONESIA

Merak – Banyuwangi

Merak (ferry terminal)	
<u>Jakarta</u> (junction and maritime connection)	→ Sukabumi – Padalarang – Cikampek (junction)
Cikampek (junction)	→ <u>Cirebon</u> (junction) – <u>Semarangtawang</u> (junction) – <u>Surabayapasarturi</u> (maritime connection)
	↳ Prupuk (junction) – Purwokerto – Kroya (junction)
Bandung	
<u>Gedebage</u>	
Kroya (junction)	→ Purwokerto – Prupuk (junction) – <u>Cirebon</u> (junction)

Yogyakarta (<i>junction</i>)	→	[Magelang]
Solobalapan (<i>junction</i>)	→	Gundih – <u>Semarangtawang</u> (<i>junction</i>)
Kertosono (<i>junction</i>)	→	Wonokromo – Surabaya
Malang		
Bangil		
↓ Banyuwangi (<i>ferry terminal</i>)		

[Banda Aceh] – Pangkalansusu – Rantauprapat

[Banda Aceh]		
Pangkalansusu		
Medan (<i>junction</i>)	→	<u>Belawan</u> (<i>maritime connection</i>)
Tebingtinggi (<i>junction</i>)	→	Siantar
Kisaran (<i>junction</i>)	→	Tanjungbalai
↓ Rantauprapat	→	[Payakumbuh]

Teluk Bayur – Muaro

<u>Teluk Bayur</u> (<i>maritime connection</i>)		
Bukitputus (<i>junction</i>)	→	Indarung
Padang		
Lubuk Alung (<i>junction</i>)	→	Naras
Padang Panjang (<i>junction</i>)	→	Bukittingi – Payakumbuh
Muarakalaban (<i>junction</i>)	→	Sawahlunto
↓ Muaro	→	[Lubuklinggau]

Lubuklinggau – Panjang

Lubuklinggau		
Muaraenim (<i>junction</i>)	→	Tanjung Enim
Prabumulih (<i>junction</i>)	→	<u>Kertapati</u>
Tanjungkarang (<i>junction</i>)	→	Tarahan
↓ Panjang (<i>ferry terminal</i>)		

IRAN (ISLAMIC REPUBLIC OF)

Razi - Sarakhs

(Kapikoy, Turkey)

Razi (border station)

Sufian (junction)

Tabriz

Miyaneh (junction)

Qazvin (junction)

Tehran (junction)

Garmsar (junction)

Shahrood

Kashmar (junction)

Fariman (junction)

Sarakhs (border station and break-of-gauge)

(Sarakhs, Turkmenistan)

→ Jolfa (border station and break-of-gauge) - (Djulfa, Azerbaijan)

→ [Rasht - Bandar-e-Anzali (ferry terminal) - Astara (border station and break-of-gauge)] - (Astara, Azerbaijan)

(Ferry link to Caspian sea ports in Azerbaijan, Kazakhstan, Russian Federation and Turkmenistan)

→ Qom (junction) - Badrud (junction) - Meybod - Bafq (junction) - Kerman - [Bam - Fahraj] Zahedan (break-of-gauge) - Mirjaveh (border station) - (Koh-i-Taftan, Pakistan)

↳ Qom (junction) - Arak (junction) - Ahvaz (junction) - Khorramshahr (maritime connection)

↳ [Arak (junction) - Kermanshah - Khosravi (border station) - (Khaneghein, Irak)]

↳ Ahvaz - Bandar-Emam (maritime connection)

↳ Badrud (junction) - Esfahan

↳ Bafq (connects with Sarakhs - Bandar Abbas line)

→ Bandar-e-Amirabad (ferry terminal) (ferry link to Caspian sea ports in Azerbaijan, Kazakhstan, Russian Federation and Turkmenistan)

→ (connects with Sarakhs - Bandar Abbas line)

→ Mashhad

Sarakhs – Bandar Abbas

(Sarakhs, Turkmenistan)

Sarakhs (*border station and break-of-gauge*)

Fariman (*junction*)

Kashmar (*junction*)

Torbat Heidarieh

Tabas

Chadormalu (*junction*)

Bafq (*junction*)

Bandar Abbas (*maritime connection*)

→ Mashhad

→ (connects with Razi-Sarakhs line)

→ [Sangan (*border station*) – Herat (*border station*) – (Afghanistan)]

→ Ardakan

→ (connects with Qom-Mirjaveh line)

KAZAKHSTAN

Petropavlosk – Dostyk

(Utyak, Russian Federation)

Petropavlosk (*border station*)

Kokshetav

Astana (*junction*)

→ Ecil – Tobol (*junction and border station*) – (Kartaly, Russian Federation)

↳ Tobol (*junction*) – Aiteke-bi – Nikeltau – Kandagach (*junction*)

→ (connects with Semiglavii March-Aktogai line)

Karaghandy

Mointy (*junction*)

Aktogai (*junction*)

→ Chu (*junction*)

→ Semipalatinsk – Aul (*border station*) – (Lokot, Russian Federation)

→ (connects with Semiglavii Mar-Aktogai line)

Dostyk (*border station and break-of-gauge*)

(Alashankou, China)

Semiglavii Mar – Aktogai

(Ozinki, Russian Federation)

Semiglavii Mar

Uralsk (border station)

Iletsk I (border station), Russian Federation

→ (Orenburg, Russian Federation)

Aktobe

Kandagach (junction)

→ Nikeltau (border station) – (Orsk, Russian Federation)

↳ Nikeltau (border station) – Aiteke-bi – Tobol (junction) – Astana (junction)

→ (connects with Petropavlosk-Dostyk line)

→ Makat (junction) – Ganyushkino – (Aksaraiskaya, Russian Federation)

↳ Makat (junction) – Beyneu (junction) – Oasis – (Karakalpasia, Uzbekistan)

↳ Beyneu (junction) – Aktau port (ferry terminal) – (Ferry link to Caspian sea ports in Azerbaijan, Islamic Republic of Iran, Russian Federation and Turkmenistan)

Tyuratam

Kzyl-Orda

Arys (junction)

→ Sary-Agash (border station) – (Keles, Uzbekistan)

Chimkent

Djambul

Lugovaya (junction and border station)

→ (Bishkek, Kyrgyzstan)

Chu (junction)

→ Mointy (junction)

Almaty - I

Ushtobe

↓ Aktogai (junction)

→ (connects with Petropavlosk-Dostyk line)

KYRGYZSTAN

Bishkek – Kochkor

(Lugovaya, Kazakhstan)

↓ Alamedin

Balykchi

↓ [Kochkor]

[Kochkor – Torugart]

↓ [Kochkor

Kara-Keche

Arpa (junction)

→ [Missing link] – Osh (station Karasu) – Jalal-Abad (border station) –
(Andizhan, Uzbekistan)

↓ Torugart (border station
and break-of-gauge)
(Kashi, China)]

Border with Uzbekistan – Osh

↓ (Andizhan, Uzbekistan)

↓ Osh (station Karasu) (border
station)

LAO PEOPLE'S DEMOCRATIC REPUBLIC

[Thanaleng – Mu Gia]

↓ [(Nongkhai, Thailand)

Thanaleng (border station)

↓ Vientianne (junction)

→ [Boten (border station) – (Jinghong, China)]

↓ Thakhek (junction and border
station)

→ [Nakhon Phanom, Thailand]

↓ Mu Gia (border station)

(Mu Gia, Viet Nam)]

[Vangtao – Densavanh]

↓
[(Chong Mek, Thailand)
Vangtao (*border station*)
Pakse
Savannakhet (*junction and border station*) → [(Mukdahan, Thailand)]
Densavanh (*border station*)
(Lao Bao, Viet Nam)]

MALAYSIA

Padang Besar – Johor Bahru

↓
(Padang Besar, Thailand)
Padang Besar (*border station*)
Bukit Mertajam (*junction*) → Butterworth (*maritime connection*)
Ipoh
Kuala Lumpur (*junction*) → Port Klang (*maritime connection*)
→ Setia Jaya
Kajang
Gemas (*junction*) → Wakaf Bahru (*junction*) – Rantau Panjang (*border station*) – (Sungai Kolok, Thailand)
↳ Wakaf Bahru – Tumpat
Segamat
Kempas Bahru (*junction*) → Pasir Gudang (*maritime connection*)
→ Tanjung Pelepas (*maritime connection*)
Johor Bahru (*border station*)
(Singapore)

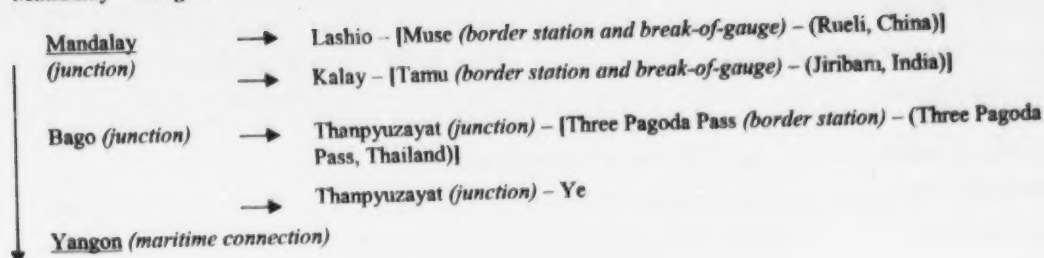
MONGOLIA

Sukhbaatar – Zamyin Uud

↓
(Naushki, Russian Federation)
Sukhbaatar (*border station*)
Ulaanbaatar
Zamyin Uud (*border station and break-of-gauge*)
(Erenhot, China)

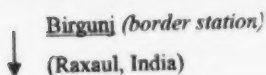
MYANMAR

Mandalay - Yangon

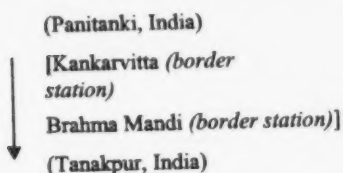


NEPAL

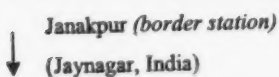
Birgunj - Border with India



[Kakarvitta - Brahma Mandi]



Janakpur - Border with India



PAKISTAN

Koh-i-Taftan – Wagah

(Mirjaveh, Islamic Republic of Iran)

Koh-i-Taftan (*border station*)

Dalbandin (*junction*)

Spezand (*junction*)

Rohri (*junction*)

Lodhran (*junction*)

Khanewal (*junction*)

Multan

Lahore (*junction*)

Wagah (*border station*)

(Attari, India)

→ [Gwadar (*maritime connection*)]

→ Quetta – Bostan – Chaman (*border station*) – (Spinbuldak, Afghanistan)

→ Hyderabad (*junction*) – Karachi (*maritime connection*) – Qasim (*maritime connection*)

↳ Hyderabad (*junction*) – Mirpurkhas – Khokropar (*border station*)

→ Sher Shah (*junction*) – Khanewal – Faisalabad – Shahdara (*junction*) (connects with Lahore-Peshawar line)

→ Sher Shah – Kundian – Attock (*junction*) – Peshawar (*border station*) – (Afghanistan)

→ Shahdara (connects with Lahore-Peshawar line)

Peshawar – Lahore

(Afghanistan)

Peshawar (*border station*)

Attock (*junction*)

Islamabad

Rawalpindi

Shahdara (*junction*)

Lahore

→ Sher Shah – Lodhran (connects with Koh-i-Taftan – Wagah line)

→ Khanewal – Lodhran (connects with Koh-i-Tafan – Wagah line)

REPUBLIC OF KOREA

Dorasan – Busan

(Bongdong, Democratic People's Republic of Korea)

Dorasan (*Northernmost station*)

Seoul

Suwon

Daejeon (*junction*)

→ Iksan (*junction*) - Mokpo (*maritime connection*)
↳ Gwangyang (*maritime connection*)

Daegu

Busan (*maritime connection*)

RUSSIAN FEDERATION

Buslovskaya – Moscow

(Vainikkala, Finland)

Buslovskaya (*border station*)

Saint Petersburg
(*junction*)

→ MGA – Volhovstroï – Koshta – Vologda – Kotelnich (*junction*) –
Ekaterinburg (*junction*)
↳ Kotelnich (*junction*) (connects with Krasnoe – Nakhodka line)
→ (connects with Krasnoe – Nakhodka line)

Moscow (*junction*)

Suzemka – Moscow

(Zernovo, Ukraine)

Suzemka (*border station*)

Bryansk

Moscow (*junction*)

→ (connects with Krasnoe – Nakhodka line)

Krasnoe – Nakhodka

(Osinovka, Belarus)

Krasnoe (*border station*)

Smolensk

Moscow

Nizhniy Novgorod

<u>Kotel'nich</u> (<i>junction</i>)	→ <u>Saint Petersburg</u>
<u>Ekaterinburg</u> (<i>junction</i>)	→ Kurgan – <u>Utyak</u> (<i>border station</i>) – (Petrovsk, Kazakhstan)
	→ Chelyabinsk – Kartaly (<i>junction and border station</i>) – (Tobol, Kazakhstan)
	↳ Kartaly (<i>junction and border station</i>) – Orsk (<i>junction and border station</i>) – (Nikeltau, Kazakhstan)
	↳ Orsk (<i>junction and border station</i>) – Orenburg – (Ilets, Russian Federation) – (Aktyubinsk, Kazakhstan)
<u>Tatarskaya</u> (<i>junction</i>)	→ <u>Lokot</u> (<i>junction and border station</i>) – (Aul, Kazakhstan)
<u>Novosibirsk</u> (<i>junction</i>)	→ <u>Lokot</u> (<i>junction and border station</i>) – (Aul, Kazakhstan)
<u>Krasnoyarsk</u>	
<u>Irkutsk</u>	
Ulan Ude	
<u>Zaudinski</u> (<i>junction</i>)	→ <u>Naushki</u> (<i>border station</i>) – (Sukhbaatar, Mongolia)
<u>Karimskaya</u> (<i>junction</i>)	→ <u>Zabaykalsk</u> (<i>border station and break-of-gauge</i>) – (Manzhouli, China)
<u>Ussurijsk</u> (<i>junction</i>)	→ <u>Grodekovo</u> (<i>border station and break-of-gauge</i>) – (Suifenhe, China)
<u>Baranovski</u> (<i>junction</i>)	→ <u>Khasan</u> (<i>border station and break-of-gauge</i>) – (Tumangang, Democratic People's Republic of Korea)
<u>Uglovaya</u> (<i>junction</i>)	→ <u>Vladivostok</u> (<i>maritime connection</i>)
<u>Nakhodka</u> (<i>junction, maritime connection</i>)	→ <u>Vostochny</u> (<i>maritime connection</i>)

Moscow – Samur

<u>Moscow</u>	
<u>Ryazan</u>	
<u>Kochetovka</u> (<i>junction</i>)	→ Rtisthevo – Saratov – Ozinki (<i>border station</i>) – (Semiglavii Mir, Kazakhstan)
<u>Gryazi</u> (<i>junction</i>)	→ Volgograd
<u>Liski</u>	
<u>Likhaya</u> (<i>junction</i>)	→ Rostov – <u>Krasnodar</u> (<i>junction</i>) – Veseloe (<i>border station</i>) – (Gantiadi, Georgia)
	↳ <u>Krasnodar</u> (<i>junction</i>) – Krimskaya (<i>junction</i>) – <u>Novo-rossiisk</u> (<i>maritime connection</i>)
	↳ Krimskaya (<i>junction</i>) – Kavkaz (<i>maritime connection and ferry terminal</i>)
<u>Volgograd</u> (<i>junction</i>)	→ Gryazi

↓

<u>Aksarayskaya</u> (<i>junction and border station</i>)	→	(Ganyushkino, Kazakhstan)
<u>Astrakhan</u>	→	Port Olya (<i>ferry terminal</i>) – (ferry links to Caspian sea ports in Azerbaijan, Islamic Republic of Iran, Kazakhstan and Turkmenistan)
<u>Makhachkala</u> (<i>border station and ferry terminal</i>)		(Ferry links to Caspian sea ports in Azerbaijan, Kazakhstan and Turkmenistan)
<u>Samur</u> (<i>border station</i>)		
(Yalama, Azerbaijan)		

SINGAPORE

Woodlands –

(Johor Bahru, Malaysia)

↓ Woodlands (*border station*)

SRI LANKA

Kataragama – Katunayake

[Kataragama

Hambantota

Matara]

Colombo (*maritime connection*)

Sri Jayewardenepura Kotte

↓ Katunayake

Colombo – Talaimannar

Colombo (*maritime connection*)

Kurunegala (*junction*)

Maho (*junction*)

↓ Talaimannar (*ferry terminal*)

→ [Dambulla]

→ Trincomalee (*maritime connection*)

→ (Rameswaram, India)

TAJIKISTAN

Nau - Kanibadam

(Bekabad, Uzbekistan)

Nau (*border station*)

Khudjand

Kanibadam (*junction and border station*)

(Suvanabad, Uzbekistan)

→ Isfara

Pakhtaabad - Yangi Bazar

(Sariasya, Uzbekistan)

Pakhtaabad (*border station*)

Regar

Dushanbe II

Dushanbe I

Yangi Bazar

Khoshad - Kulyab

(Amuzang, Uzbekistan)

Khoshad (*border station*)

Kurgan Tube (*junction*)

Kulyab

→ Yavan

THAILAND

Nongkhai - Padang Besar

(Thanaleng, Lao People's Democratic Republic)

Nongkhai (*border station*)

Bua Yai (*junction*)



Kaeng Khoi (*junction*)

→ [Nakhon Phanom (*border station*) - (Thakhek, Lao People's Democratic Republic)]

→ [Mukdahan (*border station*) - (Savannakhet, Lao People's Democratic Republic)]

→ Nakhonratchasima - Ubonratchathani - [Chong Mek (*border station*) - (Pakse, Lao People's Democratic Republic)]

Banphachi (<i>junction</i>)	→ Nakhonsawan (<i>junction</i>) – Denchai (<i>junction</i>) – Chiangmai L [Nakhonsawan – Mae Sod (<i>border station</i>) – (Myawadi, Myanmar)] L [Denchai – Chiangrai – Mae Sai (<i>border station</i>) – (Tachilek, Myanmar)]
Bangkok – Bang Sue station (<i>junction</i>)	→ Ladkrabang – Chachoengsao (<i>junction</i>) – Si Racha (<i>junction</i>) – Kao Chi Chan (<i>junction</i>) – Sattahip (<i>maritime connection</i>) → Chachoengsao (<i>junction</i>) – Aranyaprathet – Khlong Luk (<i>border station</i>) – [(Poipet, Cambodia)] → Si Racha – Laemchabang (<i>maritime connection</i>) → Kao Chi Chan – Map Ta Put (<i>maritime connection</i>)
Nong Pla Duk (<i>junction</i>)	→ Namtok – [Three Pagoda Pass (<i>border station</i>) – (Thanpyuzayat, Myanmar)]
Hat Yai (<i>junction</i>)	→ Sungai Kolok (<i>border station</i>) – (Rantau Panjang, Malaysia)
Padang Besar (<i>border station</i>) ↓ (Padang Besar, Malaysia)	

TURKEY

Kapikule – Kapikoy

(Bulgaria, Europe)

Kapikule (*border station*)

Istanbul

Eskisehir (*junction*)

→ Alayunt – Balikesir – Izmir (*border station*)

Ankara

Kalin (*junction*)

→ Samsun (*maritime connection*)

Sivas

Cetinkaya (*junction*)

→ Kars (*junction*) – Dogukapi (*border station and break-of-gauge*) – (Akhuryan, Armenia)

→ [Kars (*junction, border station and break-of-gauge*) – (Akhalkalaki, Georgia)]

Malatya (*junction*)

→ Topprakale (*junction*) – Adana – Mersin (*maritime connection*)

Topprakale – Iskenderun (*maritime connection*)

Tatvan – Van (ferry crossing)

→

Kapikoy (*border station*)

↓ (Razi, Islamic Republic of Iran)

TURKMENISTAN

Turkmenbashi – Turkmenabad

(Baku, Azerbaijan)

Turkmenbashi (ferry terminal)

→ (Ferry link to Caspian sea ports in Azerbaijan, Islamic Republic of Iran, Kazakhstan and Russian Federation)

Ashgabat

Tenzhen

Mari (junction)

→ Parakhat – Sarakhs (border station and break-of-gauge) – (Sarakhs, Islamic Republic of Iran)

Turkmenabad (junction and border station)

→ Gazodjak (border station) – (Pitnyak – K.P.449, Uzbekistan) – Dashowuz – Takhyatash (border station) – (Uzbekistan)

(Khodchadavlet, Uzbekistan)

UZBEKISTAN

Keles – Khodchadavlet

(Sari-Agash, Kazakhstan)

Keles (border station)

Tukumachi (junction)

→ Ozodlik – Angren – Khalkobad] – Pap (junction) – Kokand

Sirdarinskaya

Khavast (junction)

→ Bekabad (border station) – (Nau – Kanibadam, Tajikistan) – Suvanabad (border station) – Kokand (junction) – Margilan – Andizhan (border station) – (Osh, Kyrgyzstan)

↳ Kokand (junction) – Pap (junction) – Namangan

Samarkand

Ulugbek

Navoi (junction)

→ Tinchlik – Uchkuduk – Nukus – Kungrad – Karakalpakia (border station) – (Oasis, Kazakhstan)

Bukhara (junction)

→ Karshi (junction) – Tashguzar (junction) – [Dekhanabad – Darband] – Boysun – Kumkurgran (junction) – Sariasiya (border station) – (Pakhtabad, Tajikistan)

↳ Karshi (junction) – RZD 154 (border station) – (Talimarjan – Kerkichi (junction) – Kelif, Turkmenistan) – Termez (junction) – Galaba (border station) – (Khairaton, Afghanistan)

↳ Termez (junction) – Kumkurgran (junction) – Sariasiya (border station) – (Pakhtabad, Tajikistan)

Khodchadavlet (border station)

(Turkmenabad, Turkmenistan)

VIET NAM

Lao Cai - Ho Chi Minh City

(Hekou, China)

Lao Cai (border station)

Dong Anh (junction)

→ Luu Xa - Quan Trieu

Yên Viên (junction)

→ (connects with Hanoi - Dong Dang line)

Gialam (junction)

→ Haiphong (maritime connection)

Hanoi

Tan Ap (junction)

→ [Mu Gia (border station) - (Lao People's Democratic Republic)]
[Vung Ang (maritime connection)]

Danang

→

Ho Chi Minh City (junction)

→ [Vung Tau (maritime connection)]

→ [Loc Ninh province¹ (border station) - (Kratie, Cambodia)]
1. Exact location to be decided.

Hanoi - Dong Dang

Hanoi

Gialam (junction)

Yên Viên (junction)

→ (connects with Lao Cai-Ho Chi Minh City line)

Lim (junction)

→ Pha Lai (junction) - Halong (maritime connection)

Kep (junction)

→ Halong - Cai Lan (maritime connection)

→ Luu Xa - Quan Trieu

Dong Dang (border station)

(Pingxiang, China)

Annex II

GUIDING PRINCIPLES RELATING TO TECHNICAL CHARACTERISTICS OF THE TRANS-ASIAN RAILWAY NETWORK

1. General

The development of the Trans-Asian Railway network, as defined in Annex I of the Agreement, shall be guided by the following principles relating to technical characteristics. Parties shall make every possible effort to conform to these principles both in constructing new rail sections and upgrading and modernizing existing ones.

2. Line capacity

Railway lines of international importance must provide adequate capacity so as to allow efficient,

reliable and economical movement of rail services for goods and passengers.

3. Vehicle loading gauge

Given that the Trans-Asian Railway network will be an important component in the definition of an integrated international intermodal transport network for countries of the ESCAP region, the existing lines of the network should be, wherever necessary, upgraded and future lines should be developed so as to provide unhindered movements of ISO containers of at least 20-foot dimension in length and above.

4. Interoperability

Technical requirements should ensure seamless transport of international goods and containers along railway lines of international importance. Accordingly, railway lines and related infrastructure and equipment

should meet international requirements, including those for the transport and transfer of heavy trains carrying goods such as, *inter alia*, petroleum products, coal, mineral ores, cement and grain.

Parties should take into consideration technical requirements of neighbouring countries, as well as other countries through which railway lines of international importance pass, and endeavour to upgrade their lines so as to remove technical restrictions and ensure interoperability between railways.

Where gauge continuity permits, or is likely to result from constructing missing sections across borders, specific issues arise as regards the compatibility of rolling stock used in international transport, including braking systems and couplings. In this respect, the efficiency of railway operations across borders requires the use of air-braked rolling stock and compatible coupling systems.

For reference, the gauges of the Trans-Asian Railway network are as follows:

Railway gauge of TAR member countries (mm)				
1,000	1,067	1,435	1,520	1,676
1. Bangladesh ¹	Indonesia	1. China ²	1. Armenia	1. Bangladesh ¹
2. Cambodia		2. Democratic People's Republic of Korea	2. Azerbaijan	2. India
3. Lao People's Democratic Republic		3. Republic of Korea	3. Georgia	3. Nepal
4. Malaysia		4. Islamic Republic of Iran	4. Kazakhstan	4. Pakistan
5. Myanmar		5. Turkey	5. Kyrgyzstan	5. Sri Lanka
6. Singapore ³			6. Mongolia	
7. Thailand			7. Russian Federation	
8. Viet Nam ⁴			8. Tajikistan	
			9. Turkmenistan	
			10. Uzbekistan	

Potential members of TAR: Japan (1,067 mm gauge) and the Philippines (1,067 mm gauge).

¹ Part of railway network of the country.

² Features also a line (from/to Viet Nam) of 1,000 mm gauge.

³ Service provided by railways of Malaysia.

⁴ Features also lines of 1,435 mm gauge and dual 1,000/1,435 mm gauge.

5. Standards for container terminals

International intermodal traffic requires efficient container terminals. The international container terminals along the lines of the Trans-Asian Railway network must:

- be located as close as possible to the main trunk line so that no time is lost entering and exiting the terminal;
- be set aside from other yards so that their operations are not hampered by other shunting movements;
- offer easy access to road vehicles so as to guarantee reliability of the road-rail interface;

- have track of sufficient length at loading/unloading area to reduce the need for shunting;
- be equipped with equipment comprising of gantry cranes, straddle-carriers, top-lifters and/or reach-stackers able to handle ISO containers of at least 20-foot dimension in length;
- make provisions for possible expansion;
- offer Customs facilities for the clearance of goods.

62/5. Building the information society in Asia and the Pacific⁵

The Economic and Social Commission for Asia and the Pacific.

Inspired by the global commitment to build a people-centred, inclusive and development-oriented information society, as evidenced by the adoption of the Geneva Declaration of Principles and the Geneva Plan of Action at the first phase of the World Summit on the Information Society, held in Geneva in December 2003, as well as the adoption of the Tunis Commitment and the Tunis Agenda for the Information Society at the second phase of the World Summit, held in Tunis in November 2005,

Emphasizing the importance of universal access to knowledge and information for promoting development,

Recalling that the Tunis Agenda recognizes the intrinsic relationship between disaster reduction, sustainable development and the eradication of poverty and highlights the important role of information and communication technology tools in addressing these issues,

Recalling also that the Tunis Agenda indicates that World Summit implementation and follow-up should be an integral part of the United Nations integrated follow-up to major United Nations conferences, should contribute to the achievement of internationally agreed development goals and objectives, including the Millennium Development Goals, and should not require the creation of any new operational bodies,

Recalling further that the Tunis Agenda indicates that regional commissions, based on the request of member States and within approved budgetary resources, may organize regional World Summit follow-up activities and assist member States with technical and relevant information for the development of regional strategies and the implementation of the outcomes of regional conferences,

Recalling that the Tunis Agenda indicates that international and regional organizations should assess and report regularly on the universal accessibility of nations to information and communication technologies, with the aim of creating equitable opportunities for the growth of the information and communication technology sectors of developing countries,

Recalling also that the United Nations Millennium Declaration, as adopted by the General Assembly in its resolution 55/2 of 8 September 2000, resolved to ensure that the benefits of new technologies, especially information and communication technologies, were available to all,

Reaffirming the regional commitment to strengthen regional cooperation in information and communication technologies for development, as contained in Commission resolution 57/4 of 25 April 2001,

Recalling the regional commitment, shared vision and common strategies for the information society stipulated in the Tokyo Declaration – the Asia-Pacific Perspective on the World Summit, adopted by the Asia-Pacific Regional Conference held in January 2003,

Reaffirming the regional commitment to take action to achieve the objectives of the World Summit as well as to promote regional cooperation and effective integration of satellite-based information and communication technology applications with other information technologies for sustainable development, as contained in the Shanghai Declaration adopted by the Commission at its sixtieth session,

Noting the outcomes of the High-level Asia-Pacific Conference for the World Summit on the Information Society, held in Tehran in May/June 2005, which adopted the Tehran Declaration and the Regional Action Plan towards the Information Society for Asia and the Pacific,

Also noting the outcomes of four subregional conferences, held respectively in Kyrgyzstan in November 2004, in Fiji in December 2004, in Indonesia in February 2005 and in Nepal in March 2005, and their contributions to the global discussions on Internet governance, financing mechanisms for information and communication technology for development and the role of information and communication technologies in knowledge-based disaster management,

Recalling that the Commission at its sixtieth session expressed appreciation of the fact that ESCAP had initiated preparations for the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, and agreed to hold it in 2007,

1. *Invites all members and, as appropriate, associate members in the region to participate actively in the implementation of the World Summit on the Information Society outcomes, including, as appropriate, through the Regional Action Plan, especially by promoting regional cooperation and the creation of an enabling environment for the application of information and communication technology and the development of the information society in the region;*

2. *Invites international and regional organizations, including the members of the Regional Inter-agency Working Group on ICT, to cooperate with ESCAP in regional implementation of the World Summit on the Information Society outcomes, including, as appropriate, through the Regional Action Plan;*

⁵ See paragraphs 220 to 225 above.

3. *Also invites* regional and multilateral financial institutions, donor countries and agencies, and non-governmental organizations to contribute technical and financial resources for the implementation of the World Summit on the Information Society outcomes, including, as appropriate, through the Regional Action Plan;

4. *Welcomes* the generous offer of the Government of Malaysia to host the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific in 2007 and invites all members and, as appropriate, associate members to participate actively in the Conference;

5. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To undertake actions, using a multi-stakeholder approach, including with the participation of the private sector and civil society, to promote the exchange of information and best practices at the regional level and to facilitate policy debate on the use of information and communication technology for development, with a focus on attaining the internationally agreed development goals and objectives, including the Millennium Development Goals;

(b) To organize expert group meetings, in coordination with the International Telecommunication Union and other relevant organizations, as appropriate, to promote capacity-building in developing countries for monitoring the information society;

(c) To assist member States with technical and relevant information for the development of regional strategies and the implementation of the outcomes of regional conferences, to develop policies and plans focusing on communication technology applications;

(d) To continue, within its existing mandate, effective coordination and evaluation of activities at the regional level of all United Nations and international organizations concerned, including through the Regional Inter-agency Working Group on ICT;

(e) To build capacity consistent with the outcomes of the World Summit on the Information Society and encourage the active and collective efforts of all stakeholders and, especially, partnership among Governments, the private sector and civil society in transforming the digital divide into digital opportunities and bringing the benefits of information and communication technology to all;

(f) To continue the preparations for the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific as an important mechanism for regional follow-up to the World Summit on the Information Society;

(g) To report to the Commission at its sixty-fourth session on the implementation of the present resolution.

*5th meeting
12 April 2006*

62/6. Managing globalization through strengthened regional cooperation in trade and investment⁶

The Economic and Social Commission for Asia and the Pacific,

Recalling the 2005 World Summit Outcome and the United Nations Millennium Declaration as well as other relevant declarations adopted at international summits and conferences emphasizing the role of trade and investment as engines for economic growth and development,

Recalling also its resolution 57/5 of 25 April 2001 on integration of Asian and Pacific developing countries and economies in transition into the international trading system and resolution 60/1 of 28 April 2004 on the Shanghai Declaration,

Emphasizing the need to forge partnerships for development, in support of internationally agreed development goals, including those contained in the Millennium Declaration,

Emphasizing also the role of the regional commissions of the United Nations in capacity-building work in trade and investment in close cooperation with other relevant global and regional bodies,

Recognizing that improved market access and supply-side capacity-building enhance financial, trade and investment flows,

Reaffirming the importance of a universal, rules-based, open, non-discriminatory and equitable trading system,

Emphasizing the importance of facilitating the accession of members and, as appropriate, associate members to the World Trade Organization, consistent with its criteria, and recognizing the importance of universal integration in the rules-based global trading system,

Emphasizing also the contribution to development of regional trade agreements and their potential role as building blocks of the multilateral trading system and as catalysts for regional and global trade liberalization,

Expressing its appreciation of the revitalization of the Asia-Pacific Trade Agreement⁷ and the adoption of the Ministerial Declaration at the first session of the

⁶ See paragraphs 173 to 185 above.

⁷ Known from 1975 to 2005 as the "Bangkok Agreement".

Ministerial Council of the Asia-Pacific Trade Agreement, held in Beijing on 2 November 2005, in which Participating States committed themselves to a strengthening of the Agreement,

Recognizing the uniqueness of the Agreement as the region's oldest such agreement, the largest regional trade agreement in terms of the population it covers and the agreement that spans the widest spectrum of subregions and levels of development, and noting that these unique characteristics could lay the foundation for strengthened economic integration in a manner consistent with the principles and rules of the multilateral trading system,

Recognizing also that trade facilitation is an essential condition for strengthening economic integration and international competitiveness,

Acknowledging the vital role of the business sector in development and poverty reduction, in particular through the generation of new investments, employment and financing for development,

Underlining the importance of policies conducive to the development of competitive small and medium-sized enterprises, in particular rural-based small and medium-sized enterprises, in recognition of the fact that most of the region's poor live in rural areas,

Recognizing that a conducive business climate facilitates the mobilization of investment and other forms of stable and predictable financing from domestic and foreign resources,

Emphasizing that in an economy where knowledge and innovation increasingly are determinants of increased productivity and competitiveness for small and medium-sized enterprises, the development of science-based knowledge and technology, particularly agricultural technology, including through the transfer of technology on mutually agreed terms, is also a vital component of a conducive business climate,

1. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To continue efforts, in collaboration with regional and global partners, to undertake policy-oriented analytical work and provide technical assistance to ESCAP members and, as appropriate, associate members in order to increase their human and institutional capacity:

(i) To negotiate, conclude and implement multilateral and regional trade agreements, with a specific focus on strengthening the World Trade Organization/ESCAP Programme of Technical Assistance for Asia and the Pacific;

(ii) To formulate and implement trade facilitation and e-commerce practices for enhancing international competitiveness;

(iii) To create a domestic policy environment conducive to the development of small and medium-sized enterprises and the mobilization of stable financial and investment flows;

(iv) To promote a competitive knowledge-based economy through the development of science-based knowledge and the transfer of technology;

(b) To continue to evaluate and analyse regional and bilateral trade agreements involving ESCAP members and, as appropriate, associate members;

(c) To take measures upon entry into force of the Asia-Pacific Trade Agreement to strengthen the Agreement as an effective mechanism to promote regional cooperation in trade and related issues in conformity with the principles and rules of the multilateral trading system;

(d) To continue to organize policy dialogues in the context of managing globalization, not only among policymakers but also between government, private sector and civil society representatives, including through the Asia-Pacific Business Forum;

(e) In undertaking trade capacity-building assistance, to accord priority to the special needs of least developed countries, landlocked developing countries, countries with economies in transition and small island developing States;

(f) To report to the Commission, at its sixty-fourth session, on the implementation of the resolution.

5th meeting
12 April 2006

62/7. **Strengthening regional cooperation and coordination of early warning system arrangements for tsunamis through the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia⁸**

The Economic and Social Commission for Asia and the Pacific,

Recalling the unprecedented tsunami disaster that struck the Indian Ocean and South-East Asian regions on 26 December 2004 and caused tremendous loss of life and livelihood, as well as socio-economic and environmental damage,

Recognizing the role of natural disaster management in economic and social development and poverty alleviation,

⁸ See paragraphs 218 and 219 above.

Recalling General Assembly resolution 59/279 of 19 January 2005, entitled "Strengthening emergency relief, rehabilitation, reconstruction and prevention in the aftermath of the Indian Ocean tsunami disaster",

Recalling also General Assembly resolution 60/15 of 14 November 2005 welcoming the establishment of the Multi-Donor Voluntary Trust Fund on Tsunami Early Warning Arrangements in the Indian Ocean and Southeast Asia, hereafter referred to as the "Voluntary Trust Fund",

Noting the report of the Secretary-General to the General Assembly at its sixtieth session on strengthening emergency relief, rehabilitation, reconstruction, recovery and prevention in the aftermath of the Indian Ocean tsunami disaster (A/60/86-E/2005/77),

Recognizing the role of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization as the United Nations agency responsible for coordinating and ensuring the inter-operability of tsunami warning systems established across the globe,

Taking note of the establishment of the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) by the coordination under the Intergovernmental Coordination Group for IOTWS,

Recalling the importance of regional cooperation in tsunami disaster preparedness, the need for partnerships in minimizing vulnerability to tsunami disasters, and the requests for technical assistance, including South-South cooperation, for the development of a regional early warning system for tsunamis,

Noting the Declaration on Action to Strengthen Emergency Relief, Rehabilitation, Reconstruction and Prevention in the Aftermath of the Earthquake and Tsunami Disaster of 26 December 2004, adopted at the special meeting of leaders of the Association of Southeast Asian Nations, held in Jakarta on 6 January 2005,

Recalling the Hyogo Declaration and the Hyogo Framework for Action 2005-2015, as well as the common statement of the special session on the Indian Ocean disaster, adopted by the World Conference on Disaster Reduction, held in Kobe, Hyogo, Japan from 18 to 22 January 2005,

Noting the Phuket Ministerial Declaration on Regional Cooperation on Tsunami Early Warning Arrangements of the Phuket Ministerial Meeting of 29 January 2005, which, inter alia, emphasized the urgent need for concerted and coordinated regional efforts to develop systems for early warning of tsunamis and also invited interested parties to make contributions to the Voluntary Trust Fund,

Welcoming the establishment of the Voluntary Trust Fund, administered by ESCAP, through an initial contribution of 10 million United States dollars from the Government of Thailand and a subsequent contribution

of 2.5 million United States dollars from the Government of Sweden,

Recalling that the Voluntary Trust Fund aims to contribute to narrowing the capacity gaps in the region and ensuring the development of an integrated regional tsunami early warning system based on adequate resources and comprising a network of collaborative centres,

Noting the efforts of ESCAP in the establishment and administration of the Voluntary Trust Fund, including its convening of the first and second regular meetings of the Advisory Council, held in Bangkok on 19 January and 28 March 2006 respectively,

1. *Emphasizes* the importance of international cooperation, including South-South cooperation, as regards planning, implementation, information collection and knowledge sharing, in regional tsunami early warning systems;

2. *Recognizes* the important role of the Voluntary Trust Fund as a means of contributing to the role of the International Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization through resource mobilization for building and enhancing tsunami early warning capacities at various levels, as well as through strengthening regional and subregional cooperation and coordination essential for effective early warning system arrangements for tsunamis;

3. *Invites* Governments, donor countries, relevant international organizations, international and regional financial institutions, as well as the private sector and civil society, to consider contributing to the Voluntary Trust Fund through financial contributions and technical cooperation;

4. *Requests* the Executive Secretary to ensure that the Voluntary Trust Fund is administered efficiently, effectively and transparently, in accordance with the terms and conditions and objectives of the Fund;

5. *Invites* members and, as appropriate, associate members to accord priority to the mitigation of all natural disasters.

*5th meeting
12 April 2006*

62/8. Implementation of the International Plan of Action for the United Nations Literacy Decade⁹

The Economic and Social Commission for Asia and the Pacific,

Recalling the United Nations Millennium Declaration, in which the heads of State and Government resolved to ensure that, by 2015, children

⁹ See paragraphs 226 to 233 above.

everywhere, boys and girls alike, would be able to complete a full course of primary schooling and that girls and boys would have equal access to all levels of education,

Recalling General Assembly resolution 56/116 of 19 December 2001, by which it proclaimed the ten-year period beginning from 1 January 2003 the United Nations Literacy Decade: Education for All,

Recalling also General Assembly resolution 57/166 of 18 December 2002, in which it welcomed the International Plan of Action for the United Nations Literacy Decade,

Recalling further General Assembly resolution 60/1 of 16 September 2005, in which the Assembly emphasized the critical role of both formal and informal education in the achievement of poverty eradication and other development goals as envisaged in the Millennium Declaration,

Noting the leading role of the United Nations Educational, Scientific and Cultural Organization in the promotion of literacy and education around the world,

Reaffirming that creating literate environments and societies is essential for achieving the goals of eradicating poverty, reducing child mortality, curbing population growth, achieving gender equality and ensuring sustainable development, peace and democracy,

Noting with concern that over sixty per cent of the world's illiterates are in Asia and the Pacific,

Noting that the mid-term review of the United Nations Literacy Decade is to take place in 2007,

Believing that achieving the goal of universal primary education requires a renewed commitment to promote literacy for all,

Welcoming the efforts made by Member States to implement the International Plan of Action for the United Nations Literacy Decade,

1. *Notes with satisfaction* that a number of ESCAP members have already achieved the goal of universal primary education and that many others are on track to do so;

2. *Encourages* those members that have not yet achieved the goal of universal primary education to devise necessary strategies for reaching the poorest and most marginalized groups and to seek, where appropriate, alternative formal and non-formal approaches to learning, with a view to achieving the goals of the United Nations Literacy Decade;

3. *Invites* ESCAP members and, as appropriate, associate members, as well as relevant intergovernmental and non-governmental organizations to intensify their efforts to implement the International Plan of Action as a central focus of Education for All, taking into account internationally agreed development

goals, including those contained in the United Nations Millennium Declaration;

4. *Also invites* the international community and relevant intergovernmental and non-governmental organizations to continue to lend their financial and material support to the efforts of the ESCAP members in the achievement of the goals of the Decade;

5. *Encourages* ESCAP members to strengthen their national and professional educational institutions with a view to expanding their capacity, developing valid and reliable literacy data and promoting the provision of good quality education;

6. *Requests* the Executive Secretary to assess, within existing regular budget resources or through voluntary contributions as available and within the monitoring of the progress attained in the regional implementation of the Millennium Development Goals, the implementation of the International Plan of Action for the United Nations Literacy Decade and report on the implementation of the present resolution to the Commission at its sixty-fourth session.

*5th meeting
12 April 2006*

62/9. Regional follow-up to the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States¹⁰

The Economic and Social Commission for Asia and the Pacific,

Recalling the Mauritius Declaration and the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, adopted by the International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, held in Port Lewis from 10 to 14 January 2005, taking into account new and emerging issues,

Also recalling its resolution 61/9 of 18 May 2005, in which it called upon the members of the Thematic Working Group on Environment and Development under the Regional Coordination Mechanism to play an effective role in the implementation of the Regional Implementation Plan for Sustainable Development in Asia and the Pacific 2006-2010 adopted by the Fifth Ministerial Conference on Environment and Development in Asia and the Pacific, held in Seoul from 24 to 29 March 2005, as well as its regional initiatives, including the Seoul Initiative on Environmentally Sustainable Economic Growth (Green Growth),

¹⁰ See paragraphs 248 to 265 above.

Further recalling its resolution 60/1 of 28 April 2004 on the Shanghai Declaration, in which the special needs of small island developing States were recognized, as was the need to enhance subregional and regional integration and cooperation to support their development,

Recognizing that the United Nations Millennium Declaration articulated important goals and specific, measurable and time-bound targets related to poverty reduction, education, health and safe drinking water, and recognizing further their relevance to small island developing States,

Recognizing also that the Programme of Action for the Sustainable Development of Small Island Developing States set forth specific actions and measures to be taken at the national, regional and international levels in support of the sustainable development of small island developing States, in such areas as biodiversity, climate change, and coastal and marine resource management,

Reaffirming the desire of small island developing States to participate effectively in and benefit from the Commission's activities as a whole,

Bearing in mind that assistance to small island developing States will need to take into account their unique economic and social situations resulting from their isolation, small size and vulnerability to environmental hazards,

Welcoming the strengthening of the Least Developed Countries Coordinating Unit at ESCAP,

1. Reaffirms its support for the issues identified by the Mauritius Strategy for follow-up action in order to further implement the Programme of Action for the Sustainable Development of Small Island Developing States;

2. Stresses that the successful implementation of the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States depends on shared responsibility and strengthened partnerships, including with civil society and the private sector, and invites all members and, as appropriate, associate members and subregional, regional and international organizations to support the efforts of small island developing States to address issues of national and regional sustainable development, which includes economic, social and environmental aspects;

3. Requests the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To ensure that the activities of ESCAP, consistent with its programme of work, take into account the special needs of the small island developing States, as contained in the Mauritius Strategy;

(b) To review, analyse and disseminate information, as appropriate, on economic and social

development in small island developing States, in line with the Mauritius Strategy;

(c) To provide regional inputs, as appropriate, into the final review of the implementation of the Mauritius Strategy;

(d) To report to the Commission at its sixty-fourth session on the implementation of the present resolution.

5th meeting
12 April 2006

62/10. Strengthening statistical capacity in Asia and the Pacific¹¹

The Economic and Social Commission for Asia and the Pacific.

Recalling General Assembly resolution 55/2 of 8 September 2000 on the United Nations Millennium Declaration,

Recalling also General Assembly resolution 60/1 of 16 September 2005 on the 2005 World Summit Outcome, which strongly reiterated the determination of Member States to ensure the timely and full realization of the development goals and objectives agreed at the major United Nations conferences and summits, including those agreed at the Millennium Summit that are described as the Millennium Development Goals,

Recalling further the Fundamental Principles of Official Statistics, as adopted in 1994 by the United Nations Statistical Commission,

Recalling Economic and Social Council resolution 2005/13 of 22 July 2005 on the 2010 World Population and Housing Census Programme, in which the Council recognized the increasing importance of the 2010 round of population and housing censuses for meeting data needs for the follow-up activities to the Millennium Summit,

Recognizing the need to strengthen the capacity of many of the developing countries of the region to produce on a regular basis a minimum set of statistical data needed for monitoring social, economic and environmental conditions and designing and evaluating evidence-based policies,

Recognizing the difficulties that many developing countries face in implementing some of the major long-standing international statistical standards,

Encouraged by the capacity-building and other initiatives that are taking place at the national and international levels, in response to relevant international plans and programmes,

1. Invites members and, as appropriate, associate members to give priority to the strengthening of their official statistical systems;

¹¹ See paragraphs 164 to 168 above.

2. *Encourages* members and, as appropriate, associate members and relevant international organizations and institutions with advanced statistical systems to share expertise and information on their methodological, technological and managerial practices in statistical offices for the benefit of other countries in the region;

3. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To assist members and, as appropriate, associate members to develop their statistical systems, strengthening their capacity to collect, compile, process, analyse, disseminate and use official statistics;

(b) To provide assistance to members and, as appropriate, associate members in strengthening their capacity to monitor progress towards development goals and the internationally agreed development goals, including the Millennium Development Goals;

(c) To facilitate the development and implementation of international statistical standards in the region;

(d) To facilitate regional discussion and the sharing of information and good practices related to official statistics;

(e) To facilitate the coordination of international capacity-building activities related to the development of official statistics in the region, including cooperation among national statistical offices of developing countries;

(f) To facilitate the dissemination and use of data, including by providing a user-friendly platform to access socio-economic and environmental indicators in an internationally comparable format;

(g) To coordinate with regional and international agencies in the collection of official statistical data from members and, as appropriate, associate members in order to avoid duplication of effort and to minimize the response burden on national statistical systems;

(h) To report on the implementation of the present resolution to the Commission at its sixty-seventh session.

*5th meeting
12 April 2006*

62/11. Implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010¹²

The Economic and Social Commission for Asia and the Pacific,

Recalling the United Nations Millennium Declaration and, in particular, the Millennium Development Goals, which are aimed, inter alia, at the eradication of poverty,

Recalling also General Assembly resolution 55/279 of 12 July 2001, in which the Assembly endorsed the Brussels Declaration and the Programme of Action for the Least Developed Countries for the Decade 2001-2010,

Recalling further the 2005 World Summit Outcome, which, inter alia, reaffirmed the commitment to address the special needs of the least developed countries and urged all countries and all relevant organizations of the United Nations system to make concerted efforts and adopt speedy measures for meeting in a timely manner the goals and targets of the Programme of Action for the Least Developed Countries for the Decade 2001-2010,

Recalling General Assembly resolution 60/228 of 23 December 2005, in which the Assembly called for the convening of a high-level meeting on the mid-term comprehensive global review of the implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010, and its related preparatory meetings,

Recalling Commission resolution 59/4 on the implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010, in which it expressed its strong support for the full realization of the seven commitments made at the Third United Nations Conference on the Least Developed Countries and the Programme of Action, as well as the recommendations emanating from the international conferences on the landlocked developing countries and small island developing States,

Welcoming the enhanced focus on least developed countries by the international community since the Third United Nations Conference on the Least Developed Countries,

1. *Reaffirms* its commitment to the implementation of the Programme of Action for the Least Developed Countries for the Decade 2001-2010 so that the least developed countries of Asia and the Pacific will be able to attain internationally agreed development goals;

2. *Recognizes* the need for coherent results-based national development strategies aimed at poverty reduction, as envisaged in the Programme of Action, and effective implementation of policies leading to economic growth and sustainable development;

3. *Emphasizes* the need for appropriate strategies and greater political will by the least developed countries as well as continued commitment by their development partners, including international financial institutions, to address emerging challenges;

4. *Takes note* of the recommendations of the Regional Review of the Implementation of the Programme of Action for the Least Developed

¹² See paragraphs 248 to 260 above.

Countries for the Decade 2001-2010, which was held in Bangkok on 14 and 15 March 2006, and requests members and, as appropriate, associate members in the region to fulfil their commitments as contained in the Programme of Action;

5. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available, in close coordination with United Nations bodies, specialized agencies and related organizations in Asia and the Pacific:

(a) To ensure that the activities of ESCAP, consistent with its programme of work, take into account the special needs of the least developed countries, as contained in the Programme of Action for the Least Developed Countries for the Decade 2001-2010;

(b) To analyse and disseminate information on economic and social development in the least developing country members for submission to ESCAP thematic committees and intergovernmental committees, to promote greater awareness of the special concerns of least developed countries;

(c) To explore with donors the possibility of establishing a fund to support the participation of least developed countries in key ESCAP meetings;

(d) To assist the least developed countries, where appropriate, in the formulation of appropriate development strategies and policies in line with the Programme of Action;

(e) To provide regional inputs, as appropriate, into the final review of the implementation of the Programme of Action;

(f) To report to the Commission on the implementation of the present resolution at the sixty-fourth session through the Special Body on Least Developed and Landlocked Developing Countries.

*5th meeting
12 April 2006*

62/12. Strengthening Pacific island developing countries and territories through regional cooperation¹³

The Economic and Social Commission for Asia and the Pacific,

Recalling its earlier resolutions on the Commission's activities in the Pacific, in particular resolutions 237 (XL) of 27 April 1984 concerning institutional changes to increase the effectiveness of the Commission's role in the economic and social development of Pacific island developing countries, 269 (XLIV) of 20 April 1988 committing ESCAP to take special measures in favour of the Pacific island developing countries and increase the relevance and

effectiveness of the Commission's role and activities in the Pacific and 60/6 of 28 April 2004 on revitalization of the United Nations ESCAP Pacific Operations Centre (UN-EPOC), and noting especially the establishment of subprogramme 3, which is intended to enable the secretariat, including UN-EPOC, to assist Pacific island countries in building up their policy and management capacity to, among other things, achieve the internationally agreed goals and targets contained in the United Nations Millennium Declaration, adopted by the General Assembly in its resolution 55/2 of 8 September 2000, the Programme of Action for the Least Developed Countries for the Decade 2001-2010 and the Programme of Action for the Sustainable Development of Small Island Developing States,

Recalling also its resolution 58/1 of 22 May 2002 on restructuring the conference structure of the Commission, in particular annex VI by which it revised and focused the terms of reference of the Special Body on Pacific Island Developing Countries for it to undertake periodic review and analysis of special problems of Pacific island developing countries and territories, so as to mobilize ideas for promoting policy options to maximize the benefits they obtain from globalization, and assist in strengthening their capacity to implement poverty reduction policies and programmes and address emerging social issues in the context of the Programme of Action for the Sustainable Development of Small Island Developing States and the United Nations Millennium Declaration,

Recognizing the importance that the above-mentioned international agreements and particularly the Monterrey Consensus of the International Conference on Financing for Development attach to trade as a source of economic growth and a means for making poverty reduction strategies more sustainable and improving the living standards of people in small island developing States, and recognizing their relevance to Pacific island developing countries,

Recognizing also the efforts of countries in the region to assist Pacific island developing countries, which will contribute to the economic development of Pacific island countries, and South-South cooperation,

Appreciating that economic development opportunities for Pacific island countries can be enlarged by strengthening links to the economic dynamism and high growth economies of Asia,

Recognizing the desire of Pacific island developing countries and, as appropriate, associate members to participate effectively in and benefit from the Commission's activities as a whole,

Recognizing also that, at the Meeting of Pacific Islands Forum Leaders held in Papua New Guinea in 2005, Pacific island countries formulated and adopted the Pacific Plan for Strengthening Regional Cooperation and Integration in support of national development efforts,

Affirming that all development strategies must be nationally driven and owned,

¹³ See paragraphs 248 to 265 above.

Welcoming the convening of the Pacific Leaders United Nations ESCAP Special Session, held in Jakarta on 10 April 2006 during the sixty-second session of the Commission,

Welcoming also the revitalization of the United Nations ESCAP Pacific Operations Centre and the establishment of subprogramme 3, Development of Pacific island developing countries and territories, pursuant to Commission resolution 60/6 of 28 April 2004,

1. *Requests* the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) To take into account, consistent with the mandate of the UN-EPOC and the ESCAP programme of work, the development approach of regionalism and the priorities set out in the Pacific Plan for Strengthening Regional Cooperation and Integration in technical cooperation activities for Pacific Island developing countries;

(b) To (i) undertake research and analysis and provide advice and technical assistance aimed at building the capacity of Pacific Island developing countries to benefit from their relations with the countries of Asia in, among others, the areas of trade and investment; and (ii) investigate, in conjunction with relevant Pacific tourism bodies, options for a forum to share Asian and Pacific experiences in tourism development, to be held in 2007;

(c) To promote the South-South cooperation mechanism in order to assist Pacific Island developing countries in implementing the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States and the Pacific Plan with a view to achieving the Millennium Development Goals.

*5th meeting
12 April 2006*

B. Other decisions

Decision 62/1

Deferment of consideration of the draft resolution on the establishment of the Asian and Pacific Centre for ICST-enabled Disaster Management (APIDM)¹⁴

At its fifth plenary meeting, on 12 April 2006, the Economic and Social Commission for Asia and the Pacific decided to defer consideration of the draft resolution submitted by the Islamic Republic of Iran and entitled "Establishment of the Asian and Pacific Centre for ICST-enabled Disaster Management (APIDM)" until the sixty-third session of the Commission.

Decision 62/2

Procedure followed in the adoption of the report of the Commission on its sixty-second session¹⁵

At its fifth plenary meeting, on 12 April 2006, the Economic and Social Commission for Asia and the Pacific adopted the draft report on its sixty-second session, noting that, except for references to "the Commission elected" or "the Commission endorsed", all statements therein refer to views expressed by one or more delegations, and not to official views or decisions of the Commission.

¹⁴ See paragraphs 109 and 110 above.

¹⁵ Pursuant to the statement made by the Chairman during the adoption of the report at the fifth plenary meeting.

**STATEMENTS OF PROGRAMME BUDGET IMPLICATIONS OF ACTIONS
AND PROPOSALS OF THE COMMISSION**

**I. Programme budget implications of the draft resolution on achieving the Millennium
Development Goals in Asia and the Pacific**

Adopted as resolution 62/1

A. Requests contained in the draft resolution

In the draft resolution, the Commission requests the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

(a) Within its mandate, to strengthen regional policy dialogue for development, including on technical assistance and capacity-building, in cooperation with other bodies of the United Nations system including the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Development Programme (UNDP), and relevant international organizations including the World Trade Organization, the World Bank, the International Monetary Fund and the Asian Development Bank (ADB), within their respective mandates and competence, in a coherent manner, with a view to developing appropriate ways and means to expedite achievement of the Millennium Development Goals in the ESCAP region, including by addressing pressing economic and social issues;

(b) To continue to assist, within the mandate of ESCAP and in close coordination with other entities of the United Nations system and other relevant international organizations, the members and, as appropriate, associate members in their efforts to achieve the Millennium Development Goals through, inter alia, carrying out capacity-building and technical cooperation activities;

(c) To increase the effectiveness of the regional advisory services and regional subsidiary bodies of ESCAP in assisting member countries in achieving the Millennium Development Goals and sustainable development;

(d) To continue to assess progress towards achieving the Millennium Development Goals in Asia and the Pacific in cooperation with relevant international organizations, such as the United Nations Development Programme and the Asian Development Bank, and to transmit progress assessment to the Economic and Social Council, and especially to its annual ministerial-level substantive reviews, for consideration;

(e) To develop recommendations for achievement of the Millennium Development Goals by 2015 in the form of a regional road map, by developing and refining existing elements, and building also on related efforts or processes;

(f) To report to the Commission at its sixty-third session on the implementation of the resolution.

**B. Relationship of the requests to the biennial programme plan and priorities
for the period 2006-2007**

The requests contained in the draft resolution fall under the overall programme of work of ESCAP but are particularly relevant to subprogramme 1, Poverty and development, which aims to enable internationally agreed goals and targets relating to poverty reduction and social economic development to be achieved.

C. Activities by which the requests would be implemented

(1) Background of the requests

The background of the requests is set out in the preambular paragraphs of the draft resolution, especially in the expression by the Commission of its commitment to make poverty reduction the overarching objective of developmental partnership and cooperation in Asia and the Pacific.

(2) Activities (with time frame, where applicable) by which the requests would be implemented

(a) The secretariat will ensure that the strategic direction of the programme of work derives from the internationally agreed development goals, including those contained in the United Nations Millennium Declaration and in the outcomes of the major United Nations conferences and international agreements since 1992, while also ensuring that the special needs of least developed and landlocked countries, small island developing States, and countries with economies in transition are mainstreamed into all subprogrammes.

(b) The secretariat will focus on Millennium Development Goal areas of common concern to countries that would benefit from an exchange of experiences, policy dialogue, the sharing of good practices, mutual technical support and agreement on joint action, especially through the promotion of South-South cooperation. Moreover, to further enhance regional collaboration for the achievement of the Millennium Development Goals, the secretariat, in cooperation with UNDP and ADB, will develop and implement a regional advocacy and communication strategy on the Goals to create awareness and promote support for the Goals at all levels.

(c) In each subprogramme, the secretariat will conduct capacity development and technical cooperation activities to support members and associate members in their efforts to achieve the Millennium Development Goals by, inter alia, identifying and promoting good practices in poverty reduction, producing policy-oriented publications, undertaking pilot projects, disseminating lessons learned and organizing regional and subregional forums, as appropriate, to enhance intra- and interregional collaboration for the development of innovative ways and means to promote the achievement of the Millennium Development Goals in the region.

(d) The secretariat will continue to provide regional advisory services to support national capacity-building efforts in key areas, including environment and sustainable development, poverty reduction, ICT policies and strategies, economic statistics, development policy and strategic planning, social development and planning, and trade and investment policy.

(e) The secretariat will continue to assess and prepare reports on progress towards achieving the Millennium Development Goals in Asia and the Pacific in cooperation with relevant international organizations, such as UNDP and ADB, as well as to transmit these progress assessments to the Economic and Social Council, and especially to its annual ministerial-level substantive reviews, for consideration.

(f) The secretariat will develop recommendations for achievement of the MDGs by 2015 in the form of a regional road map, by developing and refining existing elements, and building also on related efforts or processes.

(g) The secretariat will report to the Commission at its sixty-third session on the implementation of the resolution.

(3) Relation to the approved programme of work for 2006-2007

The requests fall within the approved programme of work for 2006-2007.

(4) Implications for the programme of work for 2008-2009

It is expected that relevant activities will continue in the biennium 2008-2009.

D. Modification required of the approved programme of work for 2006-2007

The implementation of the request would not require any modification of the approved programme of work for the biennium 2006-2007.

E. Additional regular or extrabudgetary requirements at full cost for 2006-2007 in relation to item D above

On an ongoing basis, extrabudgetary resources will be sought in support of the programme of work of ESCAP with a particular emphasis on issues identified in the context of this resolution. The successful implementation of the approved programme of work requires no increase beyond the regular budget and extrabudgetary resource estimates indicated in the proposed programme budget for the biennium 2006-2007 (A/60/6 (sect.18)).

F. Potential for absorption

Please see section G.

G. Summary

- a. With regard to the reference to "within existing regular budget resources, or through voluntary contributions, as available" in operative paragraph 3 of the draft resolution, it will be recalled that the General Assembly by its resolution 45/248 B of 21 December 1990 on procedures for administrative and budgetary matters:
 - i. Reaffirms that the Fifth Committee is the appropriate Main Committee of the General Assembly entrusted with responsibilities for administrative and budgetary matters;
 - ii. Reaffirms also the role of the Advisory Committee on Administrative and Budgetary Questions;
 - iii. Expresses its concern at the tendency of its substantive Committees and other intergovernmental bodies to involve themselves in administrative and budgetary matters;
 - iv. Invites the Secretary-General to provide all intergovernmental bodies with the required information regarding procedures for administrative and budgetary matters.
- b. By its resolution 54/249 of 23 December 1999, the General Assembly endorsed an observation of the Advisory Committee on Administrative and Budgetary Questions regarding reference to "existing resources", whereby the Committee emphasized the responsibility of the Secretariat to inform intergovernmental organs concerned thoroughly and accurately whether there are enough resources to implement a new activity.
- c. This resolution will have no programme budget implications for the regular budget of the United Nations. Extrabudgetary resources on a level similar to that of previous years will be sought for the implementation of the required activities.

II. Programme budget implications of the draft resolution on the Jakarta Declaration on enhancing regional cooperation in infrastructure development, including that related to disaster management

Adopted as resolution 62/2

A. Requests contained in the draft declaration

In the draft declaration, the Commission requests the Executive Secretary, within existing regular budget resources, or through voluntary contributions, as available:

- (a) To promote appropriate instruments and modalities for enhancing regional cooperation in infrastructure development through, inter alia, capacity-building, technical cooperation activities and the promotion of the interoperability, interconnectedness and intermodality components of infrastructure development, including maritime infrastructure, as appropriate;
- (b) To forge closer cooperation with United Nations bodies, development agencies and multilateral financing institutions, as well as donors, as appropriate within their respective mandates, to strengthen global partnerships for infrastructure development, including that related to disaster risk management, reconstruction and rehabilitation;
- (c) To assist members and, as appropriate, associate members with developing policy responses to promote renewable and environmentally friendly energy sources, energy efficiency and related infrastructure;
- (d) To continue efforts to ascertain the views of the member States to identify and address the investment needs and priorities of members, and, as appropriate, of associate members, in infrastructure development, including that which contributes towards the integration of regional infrastructure;
- (e) To report to the Commission at its sixty-fourth session on the implementation of the declaration.

B. Relationship of the requests to the biennial programme plan and priorities for the period 2006-2007

The requests contained in the draft declaration fall under the overall programme of work of ESCAP for 2006-2007.

C. Activities by which the requests would be implemented

(1) **Background to the requests**

The background to the requests is set out in the preambular paragraphs of the draft declaration.

(2) **Activities (with time frame, where applicable) by which the requests would be implemented**

Request a:

The secretariat will formulate projects to strengthen regional cooperation and to provide technical assistance in the specified areas.

Request b:

The secretariat will prepare documents on policies and strategies in the region, including the participation of ESCAP in consultations with global partners on disaster risk management, reconstruction and rehabilitation.

Request c:

The secretariat will undertake policy research and reviews, consultations and the preparation of a series of studies and will arrange policy dialogues and assist members and associate members in developing their national policy responses and strategies.

In order for the secretariat to carry out these activities, commitments from participating members and associate members will be needed in order to sustain the process by linking and synergizing this initiative with national projects and initiatives.

Request d:

The secretariat will ascertain the views of member States by utilizing existing mechanisms, including legislative thematic committees, the Advisory Committee of Permanent Representatives and Other Representatives Designated by Members of the Commission, and policy dialogues with Governments and other modalities, as appropriate.

Request e:

The secretariat will report to the Commission at its sixty-fourth session on the implementation of the declaration.

(3) **Relation to the approved programme of work for 2006-2007**

The requests fall within the framework of the approved programme of work for 2006-2007.

(4) **Implications for the programme of work for the biennium 2008-2009**

The programme of work for the biennium 2008-2009 would be developed against the background of the declaration.

D. Modification required of the approved programme of work for 2006-2007

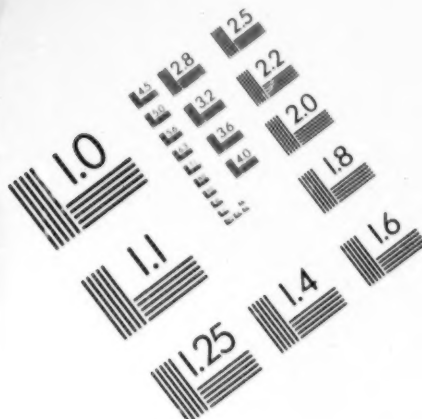
Requests (a) to (e) can be addressed under ongoing and planned activities within the approved programme of work for the biennium 2006-2007.

Programmes of work for succeeding bienniums will be developed against the background of the declaration.

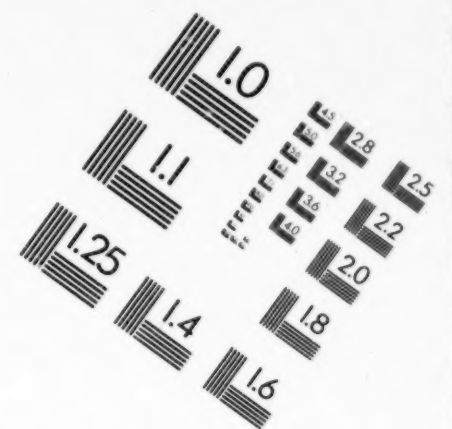
E. Additional regular or extrabudgetary requirements at full cost for 2006-2007 in relation to item D above

Regular budget

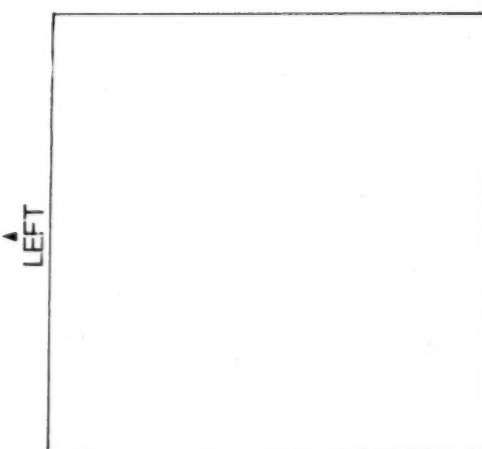
Requests (a) to (e) would not require any additional regular budget resources for the biennium 2006-2007.



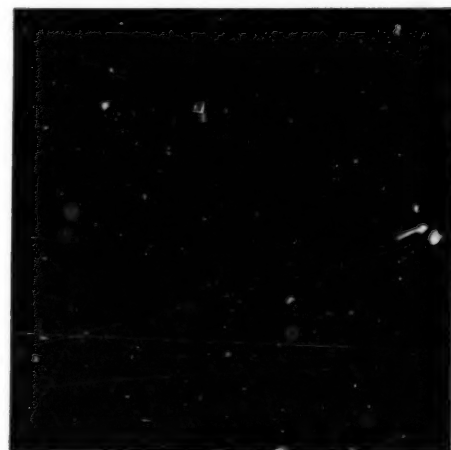
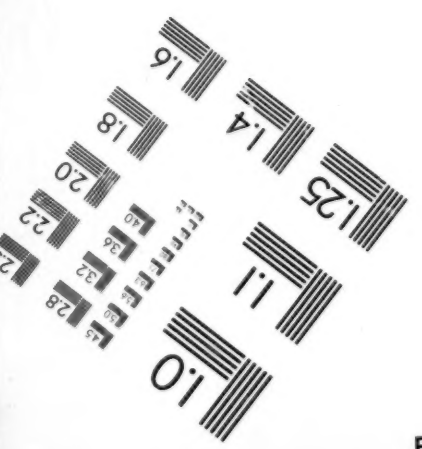
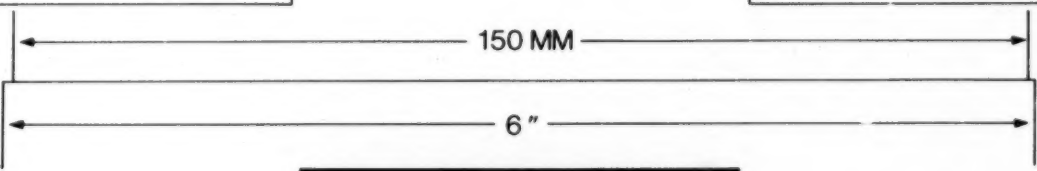
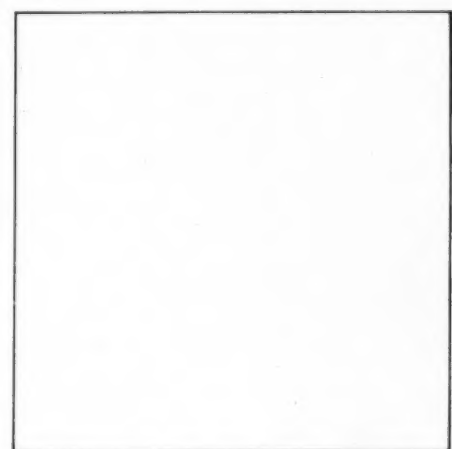
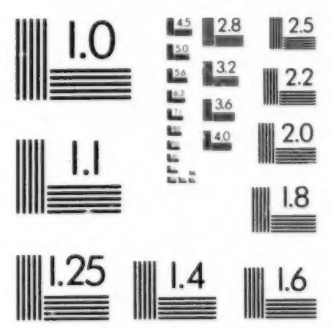
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Contents

	<i>Page</i>
Suppression of water use by physical methods	1
Sanitary sewers for developing countries — necessity or luxury?	5
Citizen participation for successful village water supply	8
Waste disposal alternatives for developing countries	10
Selecting sewerage systems to fit site conditions and budget	12
Land application of waste — state of the art	18
Selective information section	31

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SUPPRESSION OF WATER USE BY PHYSICAL METHODS*

There are two purposes for suppression of water use by consumers: conservation, or reduction of use over a prolonged period (seasonal or annual); and peak demand suppression (either maximum day or peak hour demand). Conservation and peak demand suppression have considerable effects on the size or capacity of facilities required to provide a reliable supply to the consumer.

Conservation and peak demand suppression can be achieved in several ways: by voluntary or mandatory programmes or by economic (tariff) methods. In a sense all suppression methods function by economic constraints; as a consumer uses less water he also saves money. Of course, economic incentives can be made more persuasive, in the form of penalties for not using mandated methods or large surcharges for excess water use. Discussed here are physical techniques for reducing water consumption that can be voluntary or mandatory, with or without strong economic incentives.

Conservation

Effective physical methods for reducing long-term *per capita* consumption are directed mainly at internal plumbing of domestic, commercial, and industrial customers where reductions in consumption would be realized on a year-round basis. The fittings that have been investigated most thoroughly include toilets, washing machines, and showers. Howe and Vaughan (1) reported that an over-all saving of 32 per cent of residential use, equivalent to approximately 70 litres per day, could be achieved by requiring replacement of inefficient toilets, washing machines, and showerheads. To realize such a saving would require mandatory regulations because there is little economic benefit to the consumer in buying replacement devices.

The California Department of Water Resources (DWR) (2) concluded that the following savings could be realized in domestic use if improved fittings were utilized: toilets, 10-18 per cent; showers, 9-12 per cent; clothes washers, 0-5 per cent; mean - 6-12 per cent. Potential *per capita* savings would be 19-38 litres per day for the three fittings.

A study made by the Los Angeles Department of Water and Power (3) indicated a savings of 9 per cent by the use of restrictive showerheads, toilet tank dams, and flow restrictors. The 9 per cent figure is a preliminary estimate and includes certain voluntary conservation factors, but it correlates with the California DWR data.

Perhaps the most comprehensive and thorough study on water use to date is a project completed in 1966 by Johns Hopkins University for the Federal Housing Administration.(4) The project, which collected extensive data from 39 areas in the United States, established models and analysed the data by regression equations. Many of the conclusions that can be drawn from the study relate to economics but several significant factors pertain to physical facilities, perhaps the most interesting being that metering has little effect on household consumption. However, the study established that a septic tank system suppressed household consumption by 15 per cent per annum as compared with homes connected to public sewers.

A summary of water-saving devices and the estimated water use reduction achieved by them, taken from a 1974 Environmental Protection Agency (EPA) report (5) and from other references, is shown in table 1.

Peak demand suppression

Conservation benefits mainly the source of supply. The other components of the water supply system are designed to provide for maximum day, peak hour, and fire demands. The distribution of investment shown in table 2 indicates potential cost savings that could be obtained by water use suppression methods. Conservation could reduce future capital investments by 5 to 40 per cent of total utility capital investment. Demand suppression, by comparison, could affect treatment, local pumping stations, transmission mains, service reservoirs, and distribution facilities, which comprise an estimated 50 to 75 per cent of total investment.

It is estimated that 54 per cent of California residential consumption is used for interior (household) purposes(2). The Johns Hopkins study (4) estimated national household use percentages as 54 per cent for metered services and 34 per cent for unmetered services. The study also determined the peak factors for metered services as 2.15 for peak day to average day and 5.4 for peak hour to average hour. Since so major a portion of water utility investment is made for components designed to meet peak factors (50 to 75 per cent), it can be argued that emphasis in water use suppression should be directed toward peak suppression rather than conservation.

* By Brian G. Stone, Senior Vice-President, James M. Montgomery, Inc. Reprinted from *Journal of the American Water Works Association*, vol. 70, No. 9 (September 1978), pp. 483-487, by permission of the Association, copyrighted 1978 by the American Water Works Association, 6666 West Quincy Avenue, Denver Co. 80235.

Table 1. Summary of household water-saving device

Device	Water use reduction		
	Litres/day	Gallons/day	Percentage
Toilet improvements	28-66	7.5-17.5	12-27
Faucet aerators	0-2	0-0.5	0-1
Flow limit valves, all fittings	0-2	0-0.5	0-1
Shower flow limiting	0-28	0-7.5	0-12
Pressure-reducing valves	0-61	0-16	0-20
Metering	0	0	0
Septic tanks	133	35	15
Improved clothes washers	0-30	0-8	0-5
Improved dishwashers	0-23	0-6	0-4
Hot water pipe insulation	0-23	0-6	1-4
Total	265	70	52

Table 2. Proportion of capital investment in water utility components

Component	Estimated percentage of total investment		
	Local surface supply	Distant surface supply	Ground-water system
Basic source	30	40	5
Treatment, local pumping stations, transmission mains, service reservoirs	30	30	40
Distribution system services	25	20	35
Fire protection	15	10	20

Under maximum day conditions more than 75 per cent of water may be for exterior use. Many factors contribute to the rate at which consumers use water under maximum day conditions, but one point is dominant: it is the affluent who place the greatest demand on water systems during hot weather. The Johns Hopkins study established that, in the western United States under maximum day conditions, two factors can be directly correlated to demand: potential evapotranspiration and property value.

One method of suppressing peak demands is to charge more to consumers using excess water under peak demand conditions. However, such methods must also be equitable. Discussed below are physical suppression facilities that also produce equity.

Physical suppression methods

Meters. Under maximum day conditions, meters can suppress demand by 25 to 58 per cent (2, 4).

Pressure regulation. Pressure reduction is required by the California Uniform Plumbing Code (6) for pressures in excess of 5.62 kg/cm^2 (80 pounds per square inch). Water system pressures in California are generally within the range of $2.80\text{--}9.84 \text{ kg/cm}^2$ (40-140 psi). Most services operate at pressures below 5.60 kg/cm^2 (80 psi), but in most cases 2.80 kg/cm^2 (40 psi) would provide an adequate supply. Pressure regulation reduces leakage and maintenance of faucets and toilet valves, providing a year-round water-saving feature that is equitable and reliable.

A study by the Washington Suburban Sanitary Commission (7) reported over-all conservation of 16 to 24 per cent by reducing pressures by $4.92\text{--}8.44 \text{ kg/cm}^2$ (70-120 psi) to an average of 3.52 kg/cm^2 (50 psi). Maximum day suppression was not investigated, but the capacity to peak would have been reduced theoretically by a mean of 27 per cent. In practice, maximum day demands would not be reduced by the theoretical figure, but by a lower amount because of an offsetting increased length of sprinkling by many consumers. There are no available statistical data for maximum day demand suppression resulting from pressure regulation. Suppression figures would vary depending on maximum day operating pressures within a service area and other factors, but it is possible that reductions in the range of 1 to 10 per cent could result. A pilot programme for investigation of the effects of pressure regulation is definitely needed.

Flow restrictors. A distribution system's required peaking capacity could be reduced by the insertion of flow restrictors on services at the meter. Such restrictors could be sized to adjust for service length, system pressure and site elevation so that all consumers in a defined service classification would have the same flow capacity at the meter. Flow restrictors are simple orifices, easy to install, and accurate. More sophisticated variable size orifice controllers are available but offer little advantage over fixed orifices in limiting flows. The optimum method of service classification would be a combination of pressure regulation and orifice flow regulators. It might also be necessary to provide a pressure (above a selected basic pressure) to consumers who have irrigation systems or other fixtures requiring higher operating pressures.

Service diameters. Limiting the diameter of services has been practised as a peak suppression method by most water utilities. The relative capacity of different services is listed in table 3.

A half-inch galvanized steel service 30 m (100 ft) long, with a distribution system pressure of 3.52 kg/cm^2 (50 psi), will provide a flow of approximately 0.25-0.5 litres per second (4-8 gpm), depending on the condition of the piping.

Service size limitation is an effective method of suppressing demand and is used as such by most

Table 3. Service capacities

<i>Service size (inches)</i>	<i>Material</i>	<i>Flow (litres/second)</i>
½	Galvanized schedule 40	0.5-1.0
¾	Galvanized schedule 40	1.0-2.0
1	Galvanized schedule 40	2.0-4.0
½	Copper	1.0
¾	Copper	2.0
1	Copper	4.0

Table 4. Summary of physical peak demand suppression methods

<i>Description</i>	<i>Estimated maximum day demand reduction</i>		<i>Cost per service (US dollars)</i>	<i>Comments</i>
	<i>Range (Percentage)</i>	<i>Mean (Percentage)</i>		
Service meters	25-58	40	80-400*	
Pressure regulation	0-27	5	45	Should be investigated
Flow restrictors	0-20	5	10	Should be investigated
Service diameter limitations	-	-	-	Generally now enforced
Hose meters (voluntary)	2-4	3	10	Study required
Hose meters (mandatory)	5-15	10	10	Difficult to administer
Spinkler timers	-	-	200	Expensive
Moisture sensors	0-20	10	400	Not yet proven for residential use
Landscape design	0-50	-	-	Essentially a voluntary method

* The higher amount refers to existing services.

utilities; however, provision should also be made for applications requiring greater flows.

Hose meters and timers. That lawns and gardens are overwatered is well recognized. It is estimated that the level of overwatering in California is as high as 20 per cent (2). Other estimates have placed the overwatering figure at 78 per cent for parks and recreational facilities (8). In most residential cases, sprinkling is accomplished without any timing or metering, although timers

are used on many fixed sprinkler systems. Overwatering is essentially a peak demand problem that, if reduced, would significantly suppress maximum day demands.

Untimed sprinklers represent most of the demands in California urban areas under maximum day conditions. In a large percentage of cases, sprinklers remain in operation longer than intended because of oversight, resulting in higher than necessary peak hour and peak day factors. If timers or hose meters were encouraged or

mandated, substantial reductions in peak demands could result. There is no known published data on the effect of a voluntary or mandatory consumer timer or hose meter programme. Hose meters are inexpensive (\$US7 to \$US15 per unit), but timers for sprinkler systems can cost hundreds of dollars for a complete fixed sprinkler system on a typical lot. However, it would be possible, without significant investment in equipment, to investigate the effect of both meters and timers on conservation and peak demand suppression. One voluntary hose meter utilization programme has been judged to be 2.4 per cent effective (9). A mandatory programme could possibly suppress peak day demands by 5-15 per cent, but might be difficult to administer. Mandatory restrictions on timed sprinkler use would reduce peak hour demands, but would have no effect on maximum day demand.

Moisture sensors. Moisture sensors are used for parks and recreational areas but are not economical for residential sprinkling applications. If they were used in conjunction with timers, it is estimated that maximum day demands would be reduced by 10 per cent (2). It is possible that sensors could become economical for residential use, but it is doubtful that their application would become common enough to effect a reduction in maximum day demands.

Landscape design. Landscaping methods could be considered as a physical means of water conservation and peak demand suppression, although it is difficult to dictate taste. Thus landscape design would have to be considered a voluntary method. Soil preparation, ground cover materials, paving area ratios, and selection of drought-resistant species could contribute to saving water. Landscape design and the use of unplanted or paved areas require aesthetic and economic judgments, but a change in current practices could reduce demands over a broad range.

Residential maximum day suppression. A summary of physical maximum day suppression methods is given in table 4. The total potential amount of suppression for the methods listed cannot be computed by adding amounts saved by each method because some methods are not cumulative. Furthermore some of the methods listed may not be feasible for a particular system.

Summary

Water use suppression methods can be classified as conservation methods, aimed at decreasing the supply

of water required, and peak demand suppression methods, by which system capacity to meet peak demands can be reduced. Studies of physical conservation methods have shown that long-term residential water use can be reduced by 6-12 per cent. Peak demand suppression methods have not been studied as thoroughly as conservation practices, although the potential for savings in capital investment seems to be even greater. Possible physical methods to achieve peak demand suppression include service meters, pressure regulation, flow restrictors, service diameter limitations, hose meters, sprinkler timers, moisture sensors, and landscape design.

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SANITARY SEWERS FOR DEVELOPING COUNTRIES - NECESSITY OR LUXURY?*

Transporting fecal matter by water gained widespread popularity during the industrial revolution; the basic concept has remained unaltered to this day. Coming in the Victorian era when "cleanliness was next to godliness," the concept of flushing away one's waste was attractive indeed. Sewers were advocated as the solution to the urban waste problem. The waste had to go somewhere; most often it was discharged into and effectively treated by a river. Inevitably, with urban growth and increased volume and complexity of waste water, the self-purification capacity of rivers was surpassed. Treatment of waste water before discharge became an expensive necessity.

Meanwhile in China, the technological era had not arrived; human waste was looked upon as a natural source of nutrients for plants. Instead of being regarded as an undesirable source of river pollutants, the growing cities were viewed as a valuable source of fertilizer, a place where a farmer could purchase excreta from a housewife at relatively little cost.

The two approaches to essentially the same problem exemplify the philosophical disparities between the two societies. To Western thought human excreta are useless, undesirable waste products to be gotten rid of as quickly and inoffensively as possible. To the Chinese, nightsoil is a desirable resource. With economic and population growth, the exhaustibility of water resources is putting an end to indiscriminate discharge of wastes to the environment, yet alternative approaches that are socially acceptable in Western eyes are expensive. In contrast, the Chinese continue to use excreta for agriculture. By so doing they provide a positive monetary incentive for pollution control.

Organizations providing aid to developing nations have used both approaches to waste disposal. Sanitary sewers and waste water treatment plants have been built in many cities; more are in progress. In addition, recovery of waste for agricultural use, using biogas plants to convert animal and human waste into useful material, has become increasingly widespread. For widely different reasons, neither has proven the universal solution.

Sewers not appropriate for developing nations

When the Western engineer designs urban waste disposal for a less developed nation, he almost invariably bases his design on waterborne sewage transport. This involves dilution of the waste in its most concentrated form with potable water solely for transportation. The resulting sewage, mostly water, is flushed through a

system of subterranean pipes and pumping stations to one discharge point. Because direct discharge of large volumes of waste is detrimental to the receiving water, the objective then becomes one of repurifying the water and reconcentrating and treating the waste. In short, diluting waste for transportation and then concentrating it at a treatment plant does not make sense economically or in terms of resource conservation.

Sewers and treatment plants are expensive. On a per household basis, they are far more expensive than colour television sets. Still, urban planners insist that sewers are both desirable and necessary; why?

First, there appear to be no alternatives: no technologies to fill the gap between the unsatisfactory pit privy and sewerage. Such is not the case. Systems in use in developing countries are appropriate and could be upgraded and properly designed to provide adequate service at low cost. In Botswana, Africa, for example, research showed that improved pit privies, Reed Odorless Earth Closets and double-vault composting latrines efficiently overcome health and nuisance hazards. A World Bank cost comparison showed all such systems to be significantly less expensive on a per household basis than sewerage.

Second, concepts, practices and attitudes imported mainly from the West have artificially increased the desires of policy makers for technologies their people simply cannot afford. Public officials, eager to impress their constituencies and the rest of the world with development or progress, often want nothing less than the latest and most sophisticated technology the industrialized world has to offer.

Third, the dependent developing country often requests from bilateral aid or international organizations feasibility studies and master plans for waste disposal systems. Western engineering consultants are contracted. Consulting firms are constrained by lack of experience, so they limit their choice to piped sewerage. In several cases there has been outright refusal to consider alternative methods.

This attitude is understandable. Consulting engineering firms are professionally responsible for the

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designs they propose; their reputations depend on the success of implemented schemes. As such, they can hardly be expected to endorse technologies with which they have no experience. There is a case here for the development in developing nations of engineering firms familiar with local conditions and not bound to the design criteria and technologies of industrialized states.

Sewerage not cost-effective

Despite the inaccuracy of assessing intangible benefits, a benefit-cost analysis of sewerage in developing countries did illustrate the economic characteristics of urban sewerage. The study showed generally that:

- (a) Construction periods are necessarily long because of budget constraints;
- (b) Benefits accrue from sewerage in the distant future, because sewer mains and laterals must be complete before many house connexions can be made;
- (c) Large investments are required during the first stages of sewer construction. These are not matched by early revenue returns or by health benefits;
- (d) For a municipality to invest in sewerage, a very high value must be placed on intangible environmental and amenity benefits, because health benefits are minor compared to the capital outlay required for construction and maintenance of the system.

Under the guise that any planning exercise is worth while, that baseline data will be useful when sewers can be afforded and that the plan is "given" to the recipient country without cost, development of master sewerage plans continues. There are, however, many hidden costs to this exercise in negative aid.

First, funds spent for master plans (typically \$US0.5 to 1 million) could be better used elsewhere.

Second, a large number of qualified personnel from the developing country spend valuable time they can ill afford to waste on this useless planning exercise.

Third, after being shelved for several years, the plans fall out of date and are seldom used.

The most adverse side effect is the perpetration of the misconception that there are no other financially feasible methods of waste collection and disposal. This results in the indefinite postponement of rational attempts to solve urban sanitation problems.

Developing countries are having considerable difficulty providing urban waste water management services, because the technology they are trying to apply is inappropriate. Sewerage transferred from industrialized States is capital-intensive during construction and labour-conserving during operation: quite the opposite of required economic characteristics.

Bioconversion no panacea as disposal alternative

The biogas (or bioconversion) plant has recently gained wide publicity as a resource recycling technology appropriate for developing countries. It operates on the principle used in conventional anaerobic sewage sludge digestion. The digestion tank, made of concrete or flexible butyl rubber, is daily fed water and organic farm and household waste, sometimes including human excreta. The mixture ferments without air to produce "biogas" (carbon dioxide and methane) which is used primarily for domestic cooking and lighting.

The biogas bubbles up out of the tank's digesting material to be caught in a gas holder resting on the tank's liquid surface. The gas holder rises and falls with production and use of the gas, which is drawn off through a flexible tube to the nearby household. The digested waste material comes from the tank as an odourless and innocuous slurry, which can be used as fertilizer either directly or after drying or composting with other farm wastes. Biogas plant technology is indigenous to Asia. A great deal has been published about the original work carried out in India, where 36,000 biogas plants have been built; parallel developments have taken place in the Republic of Korea and China, where 27,000 and at least 80,000 plants, respectively, have been installed.

Technically at least, the concept has considerable appeal and has gained wide popularity in the West with the rise of the appropriate technology movement. Many demonstration units have been built in the West, but few have enough waste to operate continuously. More serious fundamental research is being carried out in universities of the United Kingdom, the United States and Israel, but the technologies being considered are too high to be applicable to the rural peasant.

International agencies and appropriate technology groups have found biogas highly attractive, particularly the United Nations Economic and Social Commission for Asia and the Pacific, which held meetings in India and the Philippines on the subject. These were attended by biogas technology advocates and focused, once again, on the hardware and how it should be promoted across Asia without concern for its many failures in the past.

Success of the biogas plant in Asia has varied, having been affected by numerous interrelated factors. The dominant motivation for adopting biogas plants varies between and even within countries. Using the gas for cooking does, however, appear to be the primary benefit, with the agricultural value of the slurry often being given only marginal emphasis. The more hidden benefits related to public health and reduced deforestation are recognized only by the Governments that provide grants or soft loans (but decreasingly so) to individuals interested in installing biogas units. The Republic of Korea is now withdrawing credit from

farmers wishing to install biogas units. Credit has been essential to the expansion of biogas programmes in India and the Republic of Korea.

The major constraints to biogas utilization in rural areas pertain to non-technical factors. In particular, extension services, needed for maintenance and repair, are often lacking; likewise, banking and loan facilities are commonly cumbersome. In most situations where plants are individually owned, only wealthy farmers can afford them, because the landless labourer or tenant has neither the construction capital nor enough animals to feed the system. Problems also occur where water and land are not readily available; in particular, the land for

slurry drying or composting is costly in urban or periurban situations.

Evaluating the biogas plant is difficult. A dearth of basic information exists with respect to the capital costs of the biogas unit, costs of land, the dung produced by animals, seasonal fluctuations on demands, availability and value of resources, and products, product yields, etc. Before biogas plants are propagated across the developing world, we must support the determination of site-specific, socio-economic evaluations, the innovation of less expensive designs and the identification of those social and economic conditions under which biogas plants have the greatest chance of success.

CITIZEN PARTICIPATION FOR SUCCESSFUL VILLAGE WATER SUPPLY*

In the eyes of "developed society", clean water is a prerequisite for comfortable, healthy living. This is feasible because acquiring water takes up only a very small percentage of the American or European income, and because the thought of a cholera or typhoid epidemic running through New York or London via the water supply is truly horrific. Consequently, there is a serious danger that international water engineers will transfer these concepts and practices to developing regions where such diseases as cholera and typhoid are commonplace, indeed endemic; where disease is transmitted in many ways other than by water; and where the people simply cannot afford to pay for water supplies. These regions tend to accept external help and with it externally determined development priorities, which may have little or nothing to do with their real needs.

However, there are areas in dire need of improved water supplies, where during the dry season women must spend a good portion of the day walking as much as 10 km to scrape water from a muddy hole. These water-scarce areas justifiably demand first attention, but this justification is based on labour and time savings, not on health.

Design systems villagers can maintain

During the 1977 United Nations Water Conference in Argentina, the Mexican delegation suggested that the following be included in the Mar del Plata Action Plan:

"It is recommended that the effective participation of the public is the key for success of programmes of water management and that the lack of local participation has frequently resulted in ineffective programmes."

The phrase "lack of local participation has frequently resulted in ineffective programmes" is confirmed by the report on community water supplies, in which it was stated that rural water supply systems had sometimes been constructed at great expense, only to remain idle owing to lack of maintenance.

Without maintenance, no water system will long continue to serve. Ancient Roman aqueducts could carry water to vital urban centres only because their channels were designed and built to standards that Roman aqueduct maintenance crews could deal with. Indigenous Latin American water systems in some urban areas have functioned well because their technology has been within the scope of the maintenance capabilities of users. Split bamboo and carefully levelled rock channels, all user-maintainable and renewable, have traditionally been part of these systems. Users can maintain

such systems because they have essentially been user-planned and built. The parameters of system maintenance are determined by the design of the system.

The kind of maintenance needed is often a direct result of effective participation in planning. Included in this seemingly simple statement are many more factors than have usually been recognized in the past. National and international organizations have become increasingly aware of the potential of village people for planning, learning, managing and changing their water-use patterns, when they become truly involved in understanding this process as part of improving their standards of living.

A Mexican village water supply project completed 20 years ago illustrates this point. The village of Santa Maria, with aid agency assistance, constructed a water supply, whose success can be attributed to public participation from the very beginning. The impetus for the project came from a village survey conducted by young rural women being trained as grass-roots "home demonstration" agents. As a result of interviews with village leaders and with families in their homes, those young women helped the people define their resources and needs. Safe drinking water emerged as their paramount development priority.

Two private voluntary agencies, CARE and the American Friends Service Committee (AFSC), looking for ways to combine their limited resources for maximum effectiveness in meeting community needs, had arrived at the same conclusion: potable water was the greatest need of rural villages. With CARE in Mexico taking the initiative, the contributions of international, national and local agencies were co-ordinated to respond to the locally defined needs. An engineer from the Government of Mexico confirmed the feasibility of well-drilling as a source of good water in the area, and agreed to supervise the technical aspects of the project. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommended a type of well-drilling equipment (Bucyrus-Erie-W 20), which they were using, and offered to train operators. AFSC agreed to assign four volunteers for training for the project, and CARE provided the equipment recommended by WHO.

The people in the village formed a water committee which raised money and set up a special bank ac-

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count, which proved sufficient to cover local costs for water pipes and gasoline for the drilling rig. The amount of money was not the most important thing; the process was. The community also organized a hospitality committee so that nearly every family in the village shared in housing or feeding the four volunteers. The initial result of all this was modest, a simple handpump on the village square, but it produced clean water, which people preferred to the polluted drainage water they had formerly had to use. Ten years later, the water from the same well was being pumped up electrically to a water tank and distributed throughout the village. The village still has a water committee; its members include children of original committee members. They collect a monthly fee to pay a caretaker to maintain the well.

Successful projects are models for others

Today, drilling for potable water may seem commonplace; but 20 years ago in Mexico, this project created enough interest to make front page headlines in the Mexican newspapers and appeared in the *New York Times* and other publications. One immediate result was a request from the governor of another State in Mexico for a similar project. When he understood that the key to the success of the project was neither the CARE rig nor the AFSC volunteers, but rather the participation of local communities and village workers, he successfully replicated the project using locally available equipment and local young men in place of the AFSC volunteers. The communities selected for this work were chosen on the same basis as the original villages, after a community survey by extension workers. The new villages also offered home hospitality to the well-drillers. This hospitality, like the village survey, was an integral part of village awareness, orientation and education for effective involvement.

Another success story: in Malawi, a small country in south-eastern Africa, village participation was the key to success in bringing piped water to more than 150,000 villagers falling in the water-scarce category at a cost of less than \$3 *per capita*. The Department of Community Development and Social Welfare began on a small-scale by demonstrating that one could transport water through pipes from a perennial stream by digging all the trenches, laying the pipes, and constructing the concrete aprons and soak-away pits around the village taps. This initial demonstration mushroomed. Soon the demand for piped water outstripped their capability to deliver it.

Initially the piped water projects were small in size and made use of demonstrations and examples so

that the villagers knew exactly what they were getting into. Now, large public meetings are held to ensure that commitments are fully understood and acknowledged by all. More important, this approach involves the people not only as labourers but also as decision makers. They are, to a large extent, responsible for the success of the system and are willing to be responsible for its continued maintenance and repair.

Examples of failures are not difficult to find; they exist in most African countries, where lack of maintenance and repair capabilities in rural areas is compounded by inappropriate well-drilling equipment and several varieties of handpumps more suited to the back garden of the Western farmer than the centre of a drought-prone, populous village.

In one Asian country, approximately 50,000 wells were drilled in hard rock in water-scarce villages at a cost of \$40 million. An estimated 80 per cent of these wells are no longer producing water. The problem was not only technical; the pumps were installed with insufficient involvement of each village, the site for locating each village pump being selected by the engineer, not the village leader. The villager views the pump as belonging to the government department that installed it and therefore accepts no responsibility for looking after it.

In Bangladesh, clean water supplies to villages are being provided through a major UNICEF programme providing thousands of handpumps to villages to combat endemic cholera. The mere supply of handpumps has done little to alter wateruse practices and hygiene in the home. Consequently, it was not a surprise when the Cholera Research Laboratory in Dacca found no significant reduction in cholera in families using the handpumps for drinking water.

Conclusion

When people accept a project or programme as the solution to a need they feel, participation is more effective, their village wisdom is a guide to the choice of appropriate technology, and their understanding of the institutional arrangements can facilitate effective follow-up.

Engineers can do the technical planning to solve the problem of water supply, but the human element at the grass-roots level must be included for effective utilization and management. When, as in Santa Maria, full participation (meaning village-wide and from the beginning stage of planning) is evident, the new technologies and/or new approaches of meeting needs are usually possible.

WASTE DISPOSAL ALTERNATIVES FOR DEVELOPING COUNTRIES*

An extensive literature review (18,000 titles) conducted by the International Development Research Centre reveals several technologies for waste disposal between the unacceptable pit latrine and the too-expensive sewer system with treatment plant. These alternative technologies include improved pit latrines, the Reed Odourless Earth Closet, wet and dry vaults, and composting privies.

Improved pit latrines can be acceptable

The pit latrine, although unhealthy and unpleasant, remains one of the few technologies affordable by developing nations. Improvements can make the pit latrine more acceptable. One simple improvement is the pour-flush latrine. A pan at the lower portion of the chute maintains a water seal, which blocks the passage of odours and flies. About a quart of water is used to flush the contents into the pit. Problems with this system include blockage of the chute and lack of manual flushing, which allows exposure of waste to air.

Another improvement is a chute and pan arrangement; the pan is swivelled and counterweighted. The weight of the waste in the pan causes it to tilt and empty into the pit. A valve automatically refills the pan with water from a storage tank, ensuring regular flushing.

The Reed Odourless Earth Closet is an attempt to overcome some of the drawbacks of the pit latrine without significantly increasing the cost. It consists of a large pit (1 x 2 x 3 m deep) covered by a concrete slab. The squatting area located to one side of the slab is connected to the pit by a sloping chute. A vent pipe built into the slab draws air down the chute and up the pipe. Construction must be airtight. The closet, reportedly odourless and free of flies, has a service life of up to 20 years.

Vaults reduce ground-water contamination

One problem with pit latrines is that seepage can escape and contaminate the ground water. One solution is to line the pit, converting it into a vault. If no water is added with the waste, the vault can be emptied by bucket (dry waste) or by vacuum truck (semi-dry waste). The alternative is the wet vault, which has two types: the septic tank (common in the United States, but often more expensive on a per household basis than even sewerage for urban areas of developing countries) and the aqua-privy.

The aqua-privy is a modified cylindrical septic tank, which is filled with water upon construction and

replenished as necessary to maintain a water seal. A vertical drop pipe carries waste from a toilet bowl or a squatting plate to below the water surface. As with a septic system, solids sink to the bottom of the tank; overflow is discharged to a leaching field; and the tank sludge is removed periodically. If insufficient water is maintained in the tank, the water seal ceases to function, and flies and odours become serious problems.

A double-vault composting latrine consists of two compartments, each large enough to hold six months' waste. When one is full, the other is used, thereby providing a six-month composting period. Grass clippings, food scraps, leaves and animal wastes are added to the human excreta to maintain the carbon/nitrogen (E/N) ratio required for composting.

A double vault used in Viet Nam also has two watertight tanks, serving first for defecation and then for composting. Urine is channelled to a separate vessel, because the urine's nitrogen content can reduce the C/N ratio below the acceptable range. Before use, the bottom of each tank is lined with powdered earth. Feces are regularly covered with kitchen ashes to absorb moisture and to deodorize. When a tank is two thirds full, the surface is levelled, and the tank is filled with powdered earth and sealed to create an anaerobic environment.

An aerobic household composting system consists of a watertight tank (1 x 2 x 3 m long) with a sloping bottom. Waste introduced at the upper end mixes with kitchen and garden waste introduced lower down. Composted material moves towards the lower end and is periodically removed. The decomposition period is long, up to four years. Air ducts and a vent pipe promote aeration, evaporate humidity and, like the Reed Odourless Earth Closet, reduce odours. The sloping bottom permits continuous use of one tank by separating fresh from composted material.

Public health implications of alternative waste disposal methods

No single ranking of waste disposal technologies according to their effects on public health is possible. Good sanitation is certainly an important factor in promoting good public hygiene, but sophisticated waste disposal seems to be neither necessary nor sufficient

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for a high level of general health. Some African cities with waterborne sewage collection have high incidences of water-related disease. On the other hand, recent studies in Kyoto, Japan, showed no difference between the health of sections of the city served by sewers or septic tanks and that of those served by manual collection.

The crucial importance of social and educational factors in the improvement of public health leads to another conclusion regarding waste disposal technology. The most cost-effective method of improving sanitation may be a combination of low-cost technology (improved pit latrines, composting privies) and an educational programme on their effective use.

SELECTING SEWERAGE SYSTEMS TO FIT SITE CONDITIONS AND BUDGET*

About 28 per cent of the homes in the United States have no centralized sanitary facilities. According to the 1970 census, this means 19.5 million homes, with 58 million people, producing 3 billion gallons (11 billion litres) of raw sewage per day. Many of these homes are in low-density areas, on difficult terrain, and/or in poor communities that cannot afford gravity sewers. In areas with gravity sewers and treatment plants, a major cause of sewer moratoriums is the lack of adequate municipal collection facilities. Gravity sewers cost so much to install that some communities ban new development rather than extend the collection system.

In response to needs in rural areas and to the costs of conventional sewers, several alternative sewerage systems have developed. Some are newer than others, some more site-specific than others. But each is appropriate for consideration when new systems are designed for communities or individual homes.

The key to choosing from alternative systems is to select a cost-effective system most appropriate to site conditions. Then the system must be properly installed and maintained. Ensuring proper maintenance is a major push factor for establishing sanitary districts. The districts employ maintenance people to service equipment regularly and make repairs properly and quickly. The alternative sewerage systems highlighted here are pressure sewers, vacuum sewers and home aerobic units for preliminary treatment and mounds and evapotranspiration for effluent disposal.

Pressure sewer systems

Pressure sewers are a viable, economical alternative to gravity sewers in rural areas where homes are scattered over a wide area or in areas where gravity sewer construction is cost prohibitive because of high ground-water tables or difficult terrain. Pressure systems pump effluent from preliminary treatment units either to a main pressure line or to an existing gravity line. Small diameter pipes carry wastes under low pressure exerted by the effluent pump. Most systems are designed with 5-15 cm (2-6 in) diameter plastic or PVC piping laid parallel to the ground surface, just below the frost line.

There are two types of pressure sewers. Step systems treat the waste in a conventional septic tank and the effluent is then pumped to the main. The grinder pump system is a pump within a small storage tank. Waste solids are reduced in size through grinding, but not treated before being pumped to the main (see figures I and II).

The largest project using centrifugal grinder pumps exclusively is a combination pressure-gravity system in Lake Meade, Pennsylvania. A pressure sewer system was built because hilly terrain, high water tables, variable seasonal flows and waterfront properties made it the most cost-effective choice. The combination pressure-gravity system installed cost only two thirds that of a conventional system.

Pressure systems can be used throughout a community or for subdivisions, feeding into an existing gravity system. In rural areas, they are less expensive than gravity. The pipes are laid just below frost level, do not need to slope, and cost far less per metre to install. Pressure systems are less susceptible to ground-water infiltration. The plastic pipe is sealed, and very little initial seepage is allowed.

Pressure systems allow builders more freedom in site layout and can eliminate the need for sewer right of ways by following roads. In developments or subdivisions, wet service taps can be installed on undeveloped plots for easy hookup after site development.

The disadvantage of pressure sewers is that, although less expensive to install than gravity sewers, operational and maintenance (O and M) costs are higher. Not much O and M data are yet available, but on-lot costs are estimated at around \$US 50/house/year. Maintenance of main lines is estimated to be about \$US 160-480 per km per year. (Conventional sewer maintenance is about \$US 2,400/km/yr.) For systems operational for 5-6 years, maintenance has not been a significant problem.

An additional disadvantage is the danger of extended power failures. The step system can hold 100-200 gallons, which is probably sufficient. Ninety per cent of the power outages in the United States are 9 hours or less. The grinder system has a much smaller tank. When grinder pumps replace septic tanks and drainage fields, the tank or field can be used to handle overflow (as shown in figure I).

For the home owner, pressure systems require more maintenance than a septic tank and drainage field. The installation cost to a home owner is about \$1,500 to \$2,500. Pressure systems are most cost-effective in small communities, or new subdivisions, where the cost of installing gravity systems is very high.

* By David E. Johnson, Assistant Director, Technical Services Department, National Association of Home Builders, Washington, D.C. Reprinted with permission from the American Society of Civil Engineers, *Civil Engineering*, vol. 48, No. 9 (September 1978), pp. 90-93.

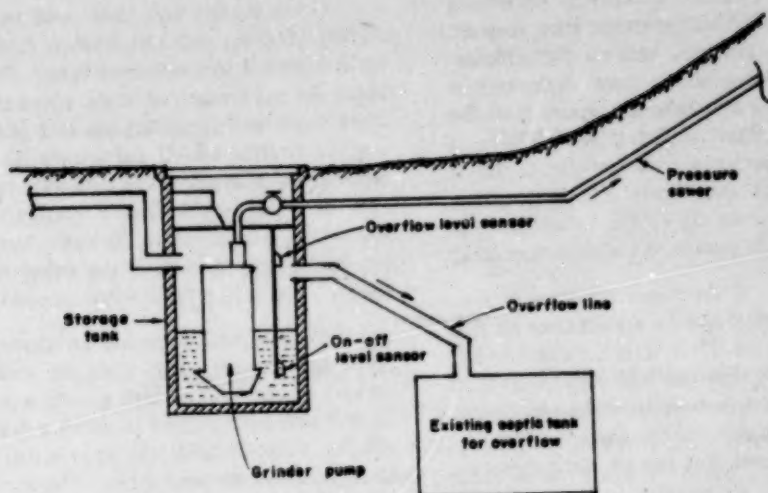


Figure I. Pressure system: typical grinder pump installation. Waste from house is reduced by grinder pump and pumped into main. To prevent overflow due to power outages or pump failures, existing septic tanks are connected to the system. For new houses, an overflow tank would be necessary.

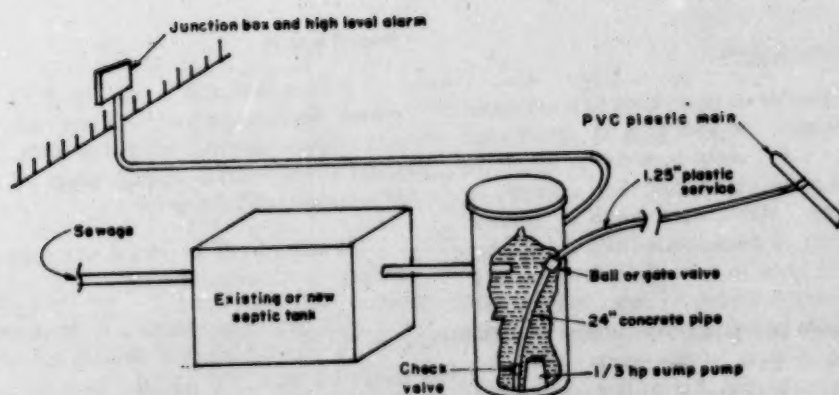


Figure II. Pressure system: typical septic tank effluent pumping. A variation of pressure sewer system. Waste is treated in septic tank and pumped to main by sump pump. System costs range from \$ 1,500 to \$ 2,500 per home, depending on site conditions.

Vacuum sewer systems

In this system, domestic waste is pulled through the collector lines to a central location by developing a vacuum on the line. The central station must keep the collector lines under constant vacuum for efficient operation. A special valve in the house connexion is designed to separate the atmospheric pressure from the vacuum in the main. When sufficient sewage collects behind the valve, it opens and waste and air are pulled into the vacuum main (see figure III). A successive series of plug reformations allows the vacuum in the collector lines to pull the sewage to the collection tank.

The applicability of the vacuum system is site-specific. Vacuum sewerage systems are efficient on flat lying or gently rolling areas. The system has a limited lift capacity (operating in about one-half atmosphere). It is also acceptable where homes are dispersed over a wide area or ground water is close to the surface. Pipes are laid just below front level, but require some grade to maintain the desired flow sequences.

Originating in Sweden, vacuum systems have been built in the United States for about fifteen years. There are operational vacuum sewers in Chicago, Virginia, Indiana and New Jersey.

Neither the equipment nor the hydraulics of vacuum sewers are as well developed as the pressure sewer. But equipment has rapidly improved and continues to do so. One drawback to the system is the energy required to maintain a constant vacuum. Another is the cost of the pumps: about \$2,500 to \$4,500 each. For home owners, the vacuum system is easy to maintain; the valve is the only moving part of the lot. For builders, the advantages are about the same as for the pressure system.

Individual home aerobic units

If it is not feasible to pipe wastes to a municipal system (either because the system is at capacity or because it does not exist), subdivision size or individual treatment units may be economical. For example, in Montgomery County, Maryland, a group of builders formed a corporation to finance, construct and operate a sewage treatment plant to serve their developments. The plant took about five years to review, design and construct. The facility permitted construction of 6,900 new homes and 240,000 m² of new commercial/industrial space in a county that has a 7-year-old sewer moratorium.

On some sites, aerobic units are an alternative to septic tanks. These units often consist of a presettling chamber, aeration compartment and secondary settling chamber (see figure IV). Raw sewage from the home flows into the unit, and is usually treated by a form of the activated sludge process. The effluent can be released to a drainage field or evapotranspiration bed. More sophisticated systems produce an effluent said by manu-

facturers to be sufficiently clean to disinfect and use for spray irrigation.

Home aerobic units cost more than septic tanks: \$1,000-2,500 for unit and drainage field. Aerobic units are also subject to mechanical failure. The batch system holds one day's worth of waste, blows air into the tank, shuts down so that settling can take place, then pumps out the supernatant. If the pumps fail, they must be replaced immediately or the tank will overflow. Another type of home aerobic unit is attached to an existing septic tank and adds air to the waste. Mechanical failures are less serious because if the pump fails, the septic tank will continue to treat waste anaerobically.

Home aerobic units are an alternative to septic tanks and drainage fields when site conditions include rocky soil, clay soil or high ground water, or if homes do not have enough land to install a drainage field. An additional advantage of the units is that the effluent is sometimes cleaner than septic effluent. Disposal possibilities include spray irrigation, subsurface and surface discharge and evapotranspiration.

In Boyd County, Kentucky, the Appalachian Regional Commission built a system that included 36 individual home aerobic units and two multifamily units to serve 11 families. (The two larger units were possible because homes were grouped together.) The plants are managed by a newly-established sanitation district.

The disinfected effluent from the units is disposed of in several ways: some is spray irrigated; some discharged into streams, evapotranspiration beds, or subsurface discharge. These homes had previously piped raw sewage into nearby streams.

Mound system

The mound system (see figure V) is a viable and proven disposal method for septic tank effluent when subsurface drain fields are not possible. Effluent is disposed by percolation through select fill (usually sand) or by evapotranspiration.

There are three critical site conditions that do not permit subsurface drainage:

- (1) *Slowly permeable soil.* Most municipal codes will not permit subsurface fields in soil with percolation rates over 24.4-27.5 min/cm. Mounds can successfully handle effluent in soils with percolation rates of 47.2 min/cm.

- (2) *Ground-water table close to soil surface.* Most States require a minimum of 90-150 cm of soil from surface to ground water. Mounds, built primarily above ground, are acceptable with as little as 60 cm of soil between surface and ground water.

- (3) *Crevice bedrock.* If there is less than 150 cm of soil covering crevice bedrock, subsurface drainage

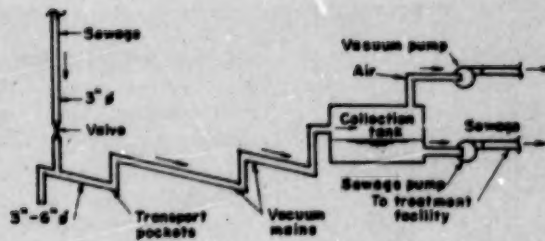


Figure III. Vacuum sewage system. When sufficient sewage collects behind the valve, it opens, waste is pulled to the transport pocket, and both ends plug with water. Water plug breaks, waste is pulled to next pocket, water plugs re-form.

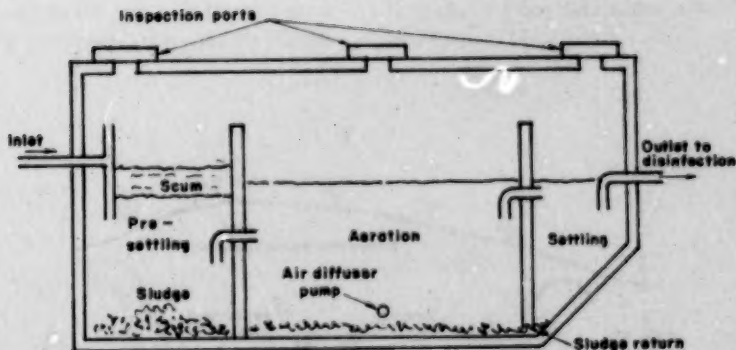


Figure IV. Typical individual home aerobic treatment unit. This is a composite drawing of home aerobic systems; several systems are marketed. Some systems produce cleaner effluent than others. Primary difference between home aerobic units and septic tanks: septic tanks treat sewage anaerobically and effluent is less clean. The biochemical oxygen demand (BOD) in septic tank effluent is 100-150 ppm, compared to 20-80 ppm for home aerobic plant effluent. The suspended solid matter (SS) is 40-50 ppm in septic tank effluent; 20-80 ppm in home aerobic unit effluent.

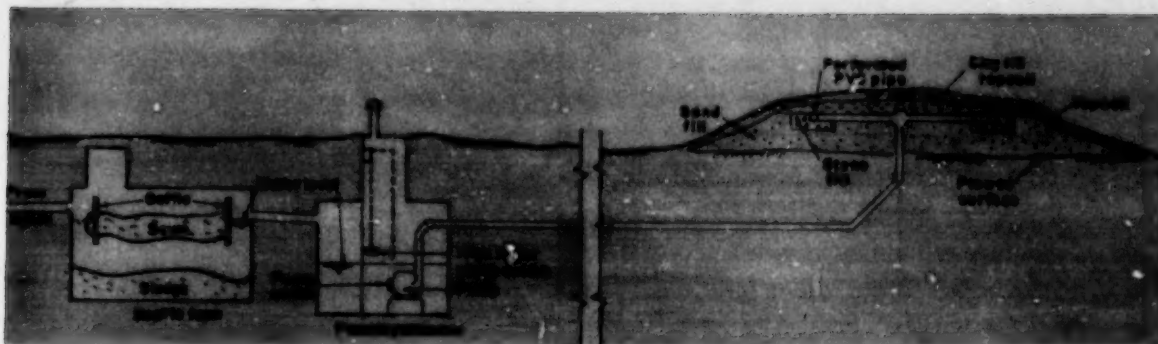


Figure V. Mound system. Mounds are an alternative to subsurface drainage fields when soil percolation rate is above 62 to 70 min/in., water table is less than 3-5' from ground surface, or soil cover of crevice bedrock is less than 5'. Costs for mound system (including septic tank) range from \$ 3,000 to \$ 4,000; yearly O and M costs are \$ 35 - 40/house.

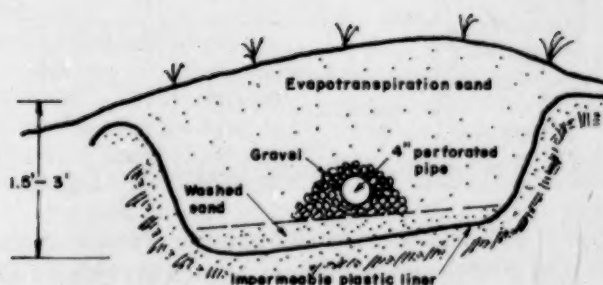


Figure VI. Typical evapotranspiration bed (ET). ET beds combine moisture evaporation from surface and transpiration from plants to dispose of effluent from septic tanks or home aerobic units. Effluent rises through sand. Liner prevents groundwater contamination. Costs (with home aerobic unit) range from \$ 4,500 to \$ 6,000, with O and M costs of \$ 75 - 125/house/year.

cannot be used. Mounds can be used when soil cover is as low as 60 cm.

There are approximately 600 mound systems in Wisconsin and 2,500 in Pennsylvania, built as a result of studies and experiments by the University of Wisconsin's Small Scale Wastewater Project.

The size of the mound depends on size of household and site conditions. For example, a 3-bedroom house on slowly permeable soil requires a mound roughly 20 m long by 15 m wide, with a 90 cm centre height. Most mounds now operating serve single homes, but technically a group of houses could share one mound. The University of Wisconsin is now designing a mound system for a school complex.

Disadvantages of mounds include cost (\$3,000 to \$4,000, compared with \$1,400 to \$2,000 for subsurface field) and aesthetics. Some home owners are not pleased to have a mound in the back yard.

The advantages are that mounds last as long and work as efficiently as subsurface fields and are a viable alternative when site conditions do not permit subsurface drainage fields.

Evapotranspiration system

Evapotranspiration (ET) systems combine moisture evaporation from the surface and transpiration by plants. The plastic lined ET bed of gravel and sand accepts and disposes of effluent (see figure VI).

Effluent discharged to the bed rises through sand to the surface where it evaporates or is used by plants.

The plastic liner prevents downward liquid penetration and ground-water contamination.

ET applicability is limited because the evaporation rate of the area must exceed the rainfall rate plus waste water flow. Semi-arid regions in the mid-western and south western United States are best suited to ET.

ET beds are used throughout the south western United States and along the eastern coast. The beds must be carefully installed to avoid puncturing the liner and a layer of sand should be installed under the liner for protection.

Long-term maintenance questions have not been answered for ET beds. One possible problem is salt build-up. It may clog the system or kill the plants, but beds have not operated long enough to know.

For more information

There is no best sewerage system. The systems discussed here, along with septic tanks and gravity sewers, allow builders and municipalities to choose the system most appropriate for site conditions.

The National Association of Home Builders (NAHB) has published a review of systems entitled *Alternatives to Public Sewers*, which can be obtained from NAHB's Washington office. A comprehensive review of the sewage disposal issue, *Less Costly Wastewater Treatment Systems for Small Communities*, is available from the Environmental Protection Agency, Washington, D.C.

LAND APPLICATION OF WASTE – STATE OF THE ART*

Introduction

The application of treated waste water to land can provide a final high level of pollutant removal. It also provides the opportunity for recycling of nutrients. Land treatment is not *ad hoc* dumping of waste water, hoping that it will somehow purify itself. Land treatment systems must be well planned and designed and carefully managed and monitored to ensure that problems do not develop.

The land application of waste water entails the use of growing plants, the soil surface and the soil matrix for removal of certain waste-water constituents. Sunlight and air make it possible for the plants to grow and the soil to remain aerobic, as well as assist in disinfection and decomposition of organic solids and organisms.

A. TYPES OF LAND TREATMENT

The three types of land application in common usage are: (1) irrigation, (2) overland flow, and (3) rapid infiltration, as schematically represented in figure 1. Each can be adapted to different site conditions, can satisfy different objectives, and can produce renovated water of varying quality, depending on design parameters and operation. There are numerous variations and combinations which can be used to optimize the system (1).

1. Irrigation method

The irrigation method is the application of waste water to agricultural lands where a crop is grown. This method can produce an economic return on the crop as well as renovating the waste water. The minimum application is normally enough to satisfy the evapotranspiration of the crops with a 30 per cent excess for deep percolation. However, some installations operate at 2.5 to 3.0 m of application per year, which provides for deep percolation of 80 to 90 per cent of the total amount applied.

The water is subjected to several processes, including physical filtering, adsorption, biological activity and natural uptake, as it percolates down through the soil. A natural disinfection caused by air and sunshine may also occur.

The soil matrix filters out suspended particles in the waste water, and soil bacteria break down the soluble organics and nitrify nitrogen in the waste water. Some of this nitrogen is taken up by the plants, some is stored in the soil, and the remainder is either denitrified (N_2 gas) or percolates downward with the renovated

waste water. Soil particles also absorb phosphorus and heavy metals while filtration and adsorption remove bacteria and viruses. Macro-nutrients, nitrogen, phosphorus and potassium, are subjected to uptake by the growing vegetation along with micro-nutrients such as copper, zinc, cadmium and nickel. By reading the fine print on a package of household plant fertilizer, one will note that the same constituents are sometimes coloured and then packaged to sell for the equivalent of several thousand dollars per ton.

This method of land treatment is most widely used. The managers of the Bortnichy State Farm in the Ukrainian Soviet Socialist Republic have found irrigation land treatment very satisfactory. This farm, which serves Kiev, is 16 years old, and has been extensively studied by the Government. The farm is described later in this text (2).

2. Overland flow

Overland flow is the application of waste water to a vegetated slope where the waste water travels along the soil-vegetation interface. The bacteria growing at the interface and on the vegetation treat the waste water in a manner similar to a trickling filter plant. While the treatment mechanism is primarily biological, there is also physical treatment caused by the filtering action of the grass. Waste water also penetrates the top few inches of soil and flows longitudinally through it, and metals, phosphorus and other nutrients are absorbed on soil particles. The growing plants also uptake nitrogen, phosphorus and potassium (3).

With overland flow, application rates often range between 3 and 8 m per year and, therefore, as much as 90 to 95 per cent of the applied waste water can be recaptured for recycling and reuse or discharged to the stream in a near pollutant-free condition.

Overland flow was "invented" in Ohio by a food processing company. It is generally used on very tight soils where there is essentially no downward percolation capacity. Figure 11 demonstrates how overland flow is related to the other two types of land treatment in terms of soil type.

* By Kenneth R. Wright, Partner, Wright-McLaughlin Engineers, and President, Wright Water Engineers, and Catherine Kraeger Rovey, Water Resources Engineer, Wright Water Engineers. Reprinted with permission from *Groundwater*, vol. 17, No. 1 (January-February 1979), pp. 47-61. Presented at the Fourth National Ground Water Quality Symposium, Minneapolis, Minnesota, 20-22 September 1978. (The introduction was shortened because it dealt specifically with current environmental legislation in the Congress of the United States of America).

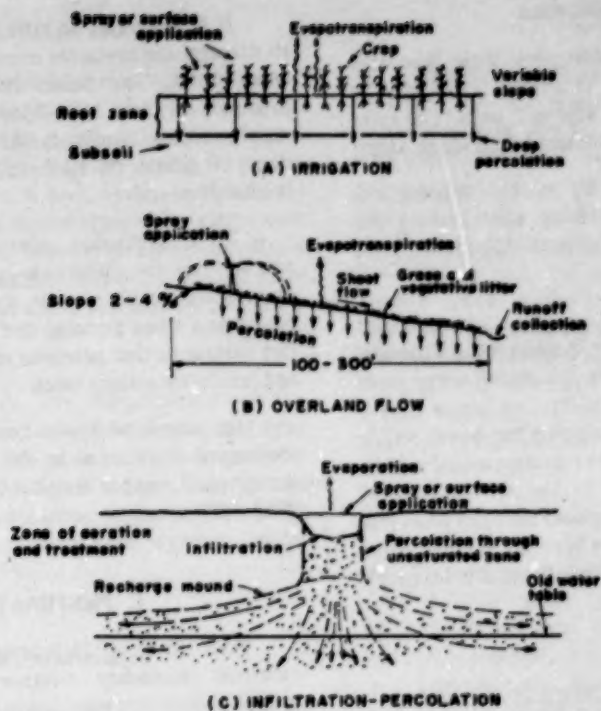


Figure I. Types of land application in common usage

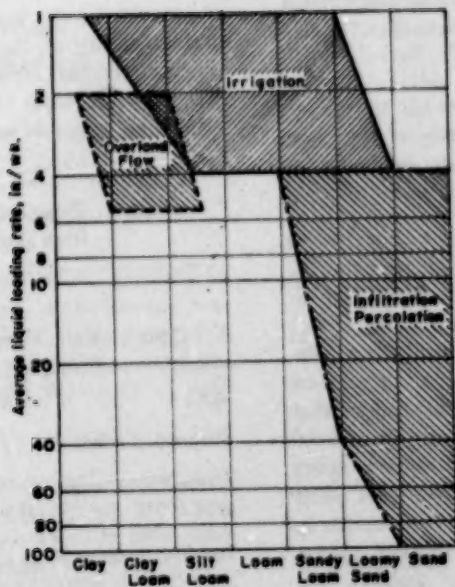


Figure II. Compatibility of land application types with different soils

3. Rapid infiltration

Rapid infiltration requires very little land area and high permeability. The renovated water can be recovered by underdrains or adjacent wells. The main goal of rapid infiltration is treatment of the waste water.

This method operates by merely flooding the grassed surfaces of shallow basins and allowing the waste water to seep into the ground. Application rates range from 30 to 120 m per year (4).

An *ad hoc* rapid infiltration system has been used satisfactorily on the Widefield Aquifer near Colorado Springs for some fifteen years. Municipal water wells are located adjacent to the infiltration ponds. Monitoring of the municipal water supplies has been careful. The water tap foaming problems encountered were from detergent in the days prior to the introduction of biodegradable detergents. Occasional nitrogen problems have been reported. There have been no reported cases of illness related to virus or bacteria transmitted through the aquifer (5).

B. IMPORTANCE OF GROUND WATER

Ground water throughout the world is an important natural resource with high economic value and sociological impact. It is important not only for protecting ground-water aquifers from being polluted beyond maximum levels, but also for enhancing the quality of ground water whenever feasible through proper management.

Alluvial aquifers along streams and rivers have frequently been allowed to degrade as a result of recharge with polluted surface stream water. Degradation of deep ground water has occurred as a result of human activities in aquifer recharge areas.

At Thornton, Colorado, old gravel pits and alluvial wells are used as the main water source for two cities during the winter and as a supplemental source during the summer.

The Thornton well field area lies several miles downstream from the direct surface discharge point for the Denver Metro Sewage Treatment Plant. Late in 1977, an emergency arose as a result of nitrite (NO_2) contamination of the potable water supply being delivered through the distribution system (6). The problem was noticed when a local aquarium owner reported that his fish were dying. Analyses showed that the alluvial aquifer was being recharged with effluent containing 16 mg/l of ammonia nitrogen. The treatment plant was suspected of converting ammonia to toxic nitrite between the well pumping and the delivery to the distribution system. To alleviate the problem, the water wells located immediately adjacent to the surface stream were shut down and a monitoring programming was instituted.

It is important to note that no effort was made to decrease the ammonia concentrations in the effluent discharged to the South Platte River. The City of Brighton, further downstream, derives its municipal supply from the same alluvial aquifer. High concentrations of nitrate (NO_3) have been reported there for at least 20 years.

Wells, infiltration galleries, and floodplain gravel pits are used for withdrawing ground water. An evaluation of the aquifer and its characteristics is of special importance when planning and designing a land application system so that potential problems can be identified and preventive actions taken.

On any land application project, a monitoring programme is essential so that trends in ground-water quality and possible escape of pollutants can be identified early.

C. PRETREATMENT

Prior to land application, waste water usually undergoes secondary treatment. Such treatment is recommended, but with relaxed criteria for suspended solids (7).

The quality of waste water applied to the land varies significantly. For example, in Melbourne, Australia, the waste water receives only primary treatment prior to either irrigation or overland flow. In the Ukrainian SSR, the waste water is given full secondary treatment (8). It is important that waste water not be overtreated prior to land application, not only because of the extra cost involved, but also because too much treatment can remove valuable nutrients. The quality of renovated water is not significantly affected by the organic quality of the water applied, that is, by Biochemical Oxygen Demand (BOD) and suspended solids. The renovated water can generally be expected to fall within the ranges of water quality as shown in table 1.

Table 1. Expected quality of renovated water from land treatment systems

Constituent	Irrigation	Value, mg/l	
		Infiltration-percolation	Overland flow
BOD	1 to 2	2 to 5	5 to 10
Suspended solids	1 to 2	1 to 2	8 to 10
Ammonia nitrogen as N	0.5 to 1	0.5 to 1	0.5 to 1
Total nitrogen as N	2 to 4	10 to 15	2 to 5
Phosphorus as P	0.1 to 0.5	1 to 3	3 to 5

Source: Environmental Protection Agency, *Land Treatment of Municipal Waste-water Effluents* (January 1976).

D. SITE SELECTION

Selection of a suitable land treatment site should involve a thorough investigation of physical characteristics, including soil texture and permeability, underlying geology, topography, and proximity to ground water and surface water. A land treatment site should have the capabilities of transmitting water either over land or through the soil at some desired, controllable rate, and to provide sufficient treatment so that water leaving the site does not cause degradation of the environment.

When evaluating the site characteristics and the related water reclamation capabilities, one should keep in mind that present land application facilities generally do not stress the soil treatment system. Investigations by the Public Works Association Research Foundation indicated that most land application systems provide a large factor of safety (9).

1. Soil characteristics

In most areas, the Soil Conservation Service (SCS) has summaries of physical and chemical properties of soils. Knowledge of these properties is necessary for selecting the optimum land application site and for properly designing the system. Typically, the data provided by SCS include:

- (a) Depth to bedrock or gravel;
- (b) Depth to seasonal water table;
- (c) Permeability of each soil zone;
- (d) Sieve analyses;
- (e) Permeability of each soil zone;
- (f) Available water capacity of each zone;
- (g) pH of each soil zone;
- (h) Salinity;
- (i) Shrink/swell potential; and
- (j) Corrosivity.

The depth to ground water should generally be 1.5 m or more to ensure proper renovation and root development. However, if the depth to the water table is less than 1.5 m, artificial water-table control can generally be instituted by using drains or by well pumping.

For rapid infiltration systems, well-drained soils such as sandy clays, sandy loams, loamy sands and gravels are preferred, with depth to water table from 3 to 5 m unless underdrains are used.

Soils with limited permeability such as clays and clay loams are best suited for overland flow systems (10).

2. Geology

Underlying geology is an important consideration in selecting a land treatment site, because it must provide a structural base for the site and, for the irrigation and rapid infiltration methods, a repository or conveyance medium for the treated water leaving the soil zone. Limestone or dolomite areas may be suitable land treatment sites if the soil zone is sufficiently thick and well graded. The pH of the waste water should receive special evaluation when limestone forms the bedrock. Karst areas should generally be avoided because of the potential for sinkhole collapse. Areas underlain by fractured rock can be suitable land treatment sites if the soil overlying the rock is sufficiently thick to prevent piping, which can short-circuit partially treated or untreated water.

3. Topography

A wide variety of topographical conditions can be incorporated into land application sites; however, unusual topography can lessen the application operation and increase costs. For cultivated agriculture, a land surface slope should not exceed approximately 15 per cent. However, when centre pivot sprinkling systems are used, slopes of up to 20 per cent are feasible. Sometimes wooded terrain is used for land application because of the nature of the soil cover. Wooded slopes of up to 30 per cent are suitable. For overland flow systems, slopes of 2 to 8 per cent are satisfactory (11).

4. Proximity to Water

The water table underlying an irrigation site should be deep enough to ensure aerated soil conditions. Generally, 2.5 m is considered adequate. Periodic increases of the water table resulting from irrigation application can bring the water table closer to the surface. In this case, special analyses are required to determine the length of time that the root zone is saturated. With a shallow water table, it is often economical to install underdrains to provide positive water-table control and to provide for easy monitoring of reclaimed water.

Valley bottom land can provide good land treatment sites for all three methods. The frequency and extent of floods should be analysed, but other than for low lands which are frequently flooded (2 to 5 years), floodplain lands often make ideal land treatment sites (12).

The designer should avoid potential short circuiting of waste water directly to surface water, streams or lakes. In many areas, minimum distances from land surface waste disposal sites to surface-water bodies are specified by law.

5. Climate

Waste-water application, except for rapid infiltration, is often restricted to the growing season which is usually defined by that period between the first and last killing frost; however, for pasture, hay and woods irrigation is often beneficial during the months preceding and following the killing frosts.

Warm climates provide special advantages for land treatment. Nevertheless, many successful projects have been operated at northern latitudes. Some rapid infiltration systems operate year-round in cold climates with the waste water being applied under the ice cover, such as at Lake George, New York.

E. PUBLIC HEALTH CONSIDERATIONS

Public health concerns relate to: viruses and pathogenic bacteria; dissolved chemical constituents; crop quality and pollutant uptake potential; and propagation of insects.

Sprayed aerosol droplets have been a concern in the public health field because of their potential to carry viruses long distances under windy conditions.

1. Pathogenic organisms

Pathogenic organisms can survive in the soil and on vegetation for a long time; some have potential lives measured in months. The survival time of organisms outside their natural habitat depends on many factors. Their survival in soil is a relatively unexplored field, though Bouwer and others report a very high degree of virus removal in their Phoenix studies under conditions which would be conducive to virus transmittal (13).

EPA reports that "The effects of working around and handling waste water on land application sites are minimal - the health hazards appear to be no different than for activated sludge and trickling filter plants."

In Melbourne, Australia, the waste-water agency has had several generations of workers directly connected to the Werribee Wastewater Farm (a discussion of the Werribee Farm will follow later in the text). For instance, one top official with the agency was born and grew up on that farm. Both his father and grandfather had been farm workers. Medical records of the present 500 residents of the farm show no special problems with the waste-water farm users. In addition, the absenteeism/sick leave records all indicate normal health for the farm workers, even those who are second or third generation employees of the 28,810-acre farm (14).

Researchers in the Soviet Union report that their public health studies on the Kiev 24,300 ha site showed no public health problems to workers or to consumers, even though 16 per cent of the crop is for direct human consumption, i.e. potatoes (13).

The Scientific Advisory Committee to Governor Lamm of Colorado has reported:

"Land application treatment of waste water is a viable alternative means to tertiary treatment in Colorado, provided proper site conditions are available. Advantages offered in the synergistic use of water, fertilizer and land resources make the potential for land treatment applications promising and the consideration of the land treatment alternative should be mandatory in waste-water treatment planning. Advantages may also exist, for gravity distribution systems, in lower energy consumption. Land treatment is highly site-specific and the possible range of site conditions within the State is very broad, varying from relatively long growing seasons in plains areas, to extremely short seasons in high mountain locations. Therefore, blanket prescriptions of the technique cannot be made, but each alternative proposal must be separately considered. Further, site specificity not only means that land application treatment might not work for some situations but also that it might be the most well-adapted technique for others. It also means that each community needs to explore a variety of land treatment adaptations before it can say definitely that no viable alternative exists" (15).

2. Heavy metals

The fate of heavy metals in land treatment systems is the item which is often of most concern to the regulatory agencies. For this reason, it is important to evaluate the uncertainties of heavy metals in waste-water effluent following secondary treatment and to analyse the long-term build-up in the soils over a long period of time. Generally, one or more of these constituents is more critical than others. Because the soil will remove and store most of the heavy metal concentrations, heavy metal build-up can, in some cases, limit a particular site to a finite number of years of operation. Normal municipal effluent does not contain any significant degree of heavy metals. If they are found in the effluent at levels which are of concern, it is appropriate to trace the contribution back to its source so that pretreatment or recycling of metals can be instituted at that particular source (1).

3. Toxic substances

A well-designed land application system has the capability of removing a high percentage of organic compounds, halogens and carcinogenic materials. With the advent of the Safe Drinking Water Act and its resulting regulations, removal of these materials should receive special evaluation and economic consideration.

4. Macro-nutrients

Nitrogen, phosphorus and potassium are macro-nutrients found in municipal waste water. Land treatment removal efficiencies are indicated in table 2.

Table 2. Expected municipal effluent removal efficiency land treatment system

Constituent	Value, percentage removal		
	Irrigation	Overland flow	Rapid infiltration
BOD	98+	98	80-85
Suspended solids	95	94	99
Total nitrogen as N	85+	80	75-80
Phosphorus as P	99+	40-80	50-60

Source: Cold Regions Research and Engineering Laboratory, waste-water management by disposal on the land (Hanover, New Hampshire, 1972).

Soil has the capability of removing and fixing nearly all potassium and phosphorus contained in the waste water. However, nitrogen is more mobile and, for this reason, the amount of nitrogen applied to the land on an annual basis should receive special evaluation to ensure that the potential concentration of nitrate nitrogen does not result in ground-water contamination. Generally, a nitrate nitrogen limit of 10 mg/l is used as an upper limit in renovated waste water.

F. SLUDGE APPLICATION

Sludge utilization on land for agricultural production is encouraged by Federal law (16). It is considered to be the ultimate disposition of sludge in a manner which will not cause environmental degradation if it is done in a planned and managed way.

The Colorado Department of Health and the State Health Board has now concluded that utilization of stabilized sludge on land for agriculture, silviculture or reclamation purposes is an environmentally acceptable alternative for solving the current sludge problem (17).

Municipal sludge contains the concentrated wastes of the community. Certain components may be toxic and/or hazardous, depending on their concentration and method of application. Such application must not degrade the surface or ground waters. The salt content of sludge can inhibit plant growth if it is applied in high concentrations or at the wrong time. Thus, the key to a proper sludge application project is to have the right quality sludge applied at agronomic rates.

The nominal reason for stabilizing the sludge is to obtain pathogenic destruction, volume and weight reduction, and odour control. Stabilization can be by

chemical treatment, digestion, or composting, the most common form being digestion by aerobic or anaerobic means. Stabilization in a lagoon bottom under anaerobic or facultative conditions is a low-cost and effective method.

The Colorado Board of Health allows sludge application without a permit if minimum standards are met relating to nutrient concentration and trace element content. For instance, nitrogen is limited to 60,000 mg/l, zinc to 3,000 mg/l, and cadmium to 30 mg/l. If standards are exceeded, the State reviews and approves on a case-by-case basis.

Colorado recommends subsurface application of sludge as a nitrogen conservation measure. With surface spreading, they estimate that 80 per cent of the ammonia nitrogen may be lost.

Crops should not be fertilized with sludge if they may be eaten raw by humans unless the sludge is first stored for one year. In addition, the Colorado Health Board allows application on ice-covered or frozen land without a permit if the land slope is 5 per cent or less. On land sloping in excess of 5 per cent, annual soil loss must be limited to 5 short tons per acre (11 tons per ha).

To protect the ground water, Colorado requires that the mean annual depth to water table be greater than 2 m and that no domestic well be closer than 45 m. Sludge can be applied in the floodplain as long as it is outside of the area flooded more often than once in 10 years. If these conditions are not met, then special review is needed with issuance of a permit.

Monitoring is required for municipal treatment plants of up to 10 million gallons per day (37,850 m³/day) with at least one sample taken every three months. For larger plants, sampling every month is required.

G. MONITORING FOR WASTE-WATER APPLICATION

Monitoring of a land application facility is required to ensure that the waste water is being properly renovated and that the environment is being protected. The influent waste water should be analysed in the same manner that conventional waste-water treatment plants are monitored so that the operator knows the specific quality of effluent being applied to the land. In addition, monitoring of the quality of renovated water, the vegetation, and the soils is recommended. This should be considered a part of the management of a land treatment facility.

Renovated water should be analysed for those parameters normally monitored in drinking-water supplies, those required by regulatory agencies, and specific parameters required by the engineer for quality control. Typically, nitrate nitrogen is the parameter most closely monitored.

Crops grown on the land application site should be analysed periodically both to optimize growth and yield and to determine crop intake level of micro- and macro-nutrients.

Soils should be tested periodically (quarterly) for salinity, pH, cation exchange capacity and infrequently (yearly) for considerations of various elements such as heavy metals.

H. CASE STUDIES

1. Bortnichy/Kiev State Farm, USSR(5)

The Bortnichy State Farm outside Kiev, USSR, is a successful land application project. The Minister of Land Reclamation and Water Management in the Ukrainian Soviet Socialist Republic has transmitted a report stating that "since the start of operation of the (waste-water) irrigation system the productivity of agricultural crops has doubled". (Personal communication with N.A. Garkusha of 24 September 1976, transmitting report by A.I. Nasushkin).

The Bortnichy Farm has 24,300 ha under production with irrigation water derived from municipal and industrial waste water generated by Kiev, a city having a population of 1,900,000. The cost of the irrigation system amounted to \$US 47,000,000 (32,000,000 roubles) in 1968. Unit cost was \$1,940/ha, which included transmission canals, laterals, pumping plants, and all field sprinkler equipment.

Description of the system

The industrial waste-water treatment uses physical-chemical processes at the industrial sources prior to its being combined with the municipal waste water. Approximately 60 per cent of the waste water is derived from industrial sources. Primary treatment consists of screening and pulverizing, followed by settling. The waste water is then routed to the secondary activated sludge plant for aeration and clarification prior to irrigation. The waste water is not disinfected prior to irrigation so as not to waste chlorine or ozone.

The sludge resulting from the primary and secondary treatment operation, which contains 3 per cent solids, is carried by pipeline to sludge drying beds where it is digested using natural processes of sunlight and drying. The USSR Government is currently studying methods of direct application of the wet sludge to the fields. Currently, the dried sludge is used as a field fertilizer with good crop response. Direct application of the 3 per cent solids wet sludge would reduce costs and result in reduced land use for natural drying beds.

Waste water is supplied to 300 irrigation rigs by 32 pumping stations for 24 hours per day. The rigs include the self-propelled power sprinklers DKSh-64, the "Volzhanka", which operate from a closed irrigation system. Irrigation occurs seven months per year, from

April to October. The total length of open canals amounts to 41 kilometres with a 1975 flow of 7.2 m³/sec. During the growing season, 45,200,000 m³ of treated waste water is used for irrigation. There is no mixing with fresh water. All irrigation is by sprinkler system to maximize efficiency of application. The soil cover in the system is mainly gray or dark gray light clayish loamy podzols.

The various types of crops in the irrigated lands are summarized in table 3. Application rates average 1,500 m³/ha per season to supplement the natural precipitation of 500 to 580 mm/year. Average temperature during the year is +7°C. The period with average daily temperatures exceeding 15°C is 115 days. Above-freezing temperatures prevail for 165 to 170 days. The average for the freezing-free period ranges from 19-25 April to 6-10 October.

Table 3. Use of Bortnichy irrigated lands

Crop	Hectares	Acres	Percentage
Cereals	7,300	18,000	30
Potatoes	3,900	9,650	16
Fodder	7,300	18,000	30
Irrigated pasture	3,900	9,650	16
Other crops	1,900	4,700	8
Total	24,300	60,000	100

Environmental effects

Officials of the USSR report no health problems. All effluent is regularly tested and is safe for irrigation. Fourteen years of health records of farm employees have been analysed and no indication has been found that workers are subject to health hazards. The quality of the waste water is constantly controlled by laboratories of various ministries.

The ground-water table ranges from 3 to 16 m in depth below ground surface. By carefully controlling application rates, the recharge to the ground-water table is strictly limited; however, care is exercised to insure against salinity build-up in the soil zone, for salinity increase would be sure to cause damage to the productivity of the soil in this rich agricultural region. The dissolved constituents in the waste water used for irrigation do not exceed 1,000 milligrams per litre.

The objectives of the use of waste water for the Bortnichy State Farms are to increase crop production and to reduce pollution of the Dneiper River which flows through Kiev and which provides environmental and recreational opportunities to the citizens of Kiev and the 49,000,000 residents of the Ukrainian SSR. The Farm is in the vicinity of the Kiev airdrome. It provides a natural buffer against development in the vicinity of the airport, which represents an important benefit.

Macro- and micro-nutrients are provided to the crops by the nutrient-rich waste water. For instance, nitrogen content in the waste water approximates 22 mg/l. The nutrients are furnished to the crops on a periodic basis with each irrigation of approximately 400 m³/ha.

There is a leaching of salts to the ground-water table, particularly because the water applied has a Total Dissolved Solids (TDS) of 1,000 mg/l. If the Ministry used fresh water (with a salinity of no more than 600 mg/l) the leaching of salts to the ground-water aquifer would be substantially less; however, artificial fertilizers would have to be applied which would tend to add more TDS concentration.

Summary

The Bortnichy State Farm at Kiev is a highly successful waste-water irrigation farm, operated by dedicated and skillful personnel of the Ministry of Land Reclamation and Water Management of the Ukrainian SSR. The project was initiated in 1962 and construction completed in 1968. The favourable economics of the irrigation system using waste-water are evident to USSR officials and to the observer as one views the green fields and busy farmhands going about their work. Crop production has doubled with the use of the waste-water irrigation system. Potatoes for human consumption are grown. Results of careful monitoring of the system and its products show no harmful effects of using waste-water for irrigation.

The economic impact in the Ukrainian SSR is significant in terms of farm income, food production, local employment, and the improved quality of the Dneiper River.

The farm covers 11,660 ha and represents the most productive agricultural land in Australia. The gross returns from the farm's sale of livestock produced approximately \$US 1,500,000 in gross revenues in 1974. The farm also provides an essential municipal service by treating waste-water. In addition to cleaning the waste-water, the farm has had a beneficial environmental impact on the area by providing a major wildlife sanctuary. The open space near the metropolitan area discourages urban sprawl in that direction. Many foreign and local visitors tour the farm yearly.

2. Melbourne, Australia: Werribee Farm System(8)

The Werribee Farm of the Melbourne and Metropolitan Board of Works is a highly productive agricultural and livestock enterprise as well as an efficient waste-water treatment project. The farm was constructed in the 1890s and is located only 22 miles from a metropolitan area with a population of 2.5 million people.

Description of the system

Melbourne's sewerage system was established in 1893 and has been in continuous operation since 1896. Raw waste-water is collected from the Melbourne metropolitan area and carried to the Werribee Farm in an open canal. Approximately 20 per cent of these wastes are industrial in nature. The farm currently receives approximately two thirds of the Melbourne area wastes. These wastes have a fifth-day BOD (biochemical oxygen demand) of 600 mg/l. In recent years, the farm has been treating raw wastes at a rate far in excess of its rated capacity. As a result, the Metropolitan Board of Works is currently exploring pretreatment works for the Werribee Farm. The farm has been and will continue to be the pride of the Board of Works. (Interview with A.H. Croxford, Chairman, Melbourne and Metropolitan Board of Works, 7 September 1976.)

Waste-water treatment is accomplished at the farm by three processes. During the irrigation season (6 to 7 months per year), raw sewage is applied to pasture areas totaling 4,190 ha. The applications are intermittent, being approximately 10 cm deep. Between applications, this provides excellent pasture for grazing cattle. Usually a drying-out period of one week is allowed prior to grazing. Approximately one fifth of the total waste-water at the farm is used in this manner. The irrigation operations are continuously controlled by approximately 100 shift workers. The major statistics of the operations are summarized in table 4.

Table 4. Melbourne and Metropolitan Board of Works Werribee Farm System parameters

	Amount	
	Metric	English
1974 annual waste-water supply	207,000,000 m ³	168,000 acre-feet
Gross farm area	11,660 ha	28,810 acres
Purification areas	7,210 ha	17,821 acres
Land filtration	4,190 ha	10,351 acres
Grass filtration	1,515 ha	3,744 acres
Lagoons	1,446 ha	3,573 acres
Sedimentation	62 ha	153 acres
Average annual rainfall	49.3 cm	19.4 inches

The waste-water not required for irrigation is treated by sedimentation and oxidation in shallow lagoons. During the winter period, the entire flow is treated by primary settling followed by grass filtration and oxidation ponds. Since permeability is not the key to this particular process, the areas used for this purpose are the heavier clay soils.

Open drains of 1.2 to 1.3 m extend throughout the irrigation area. Their function is to collect surface flows and ground-water seepage for discharge into Port Phillip Bay. Water in the drains is sampled to assure the

proper operation of the waste treatment/irrigation system.

System costs and revenues

The irrigated pastures are grazed by 15,000 head of cattle throughout the year. During the spring and summer, approximately 40,000 to 50,000 sheep are fattened and sold in the fall. About 7,000 cattle are sold annually and replaced with calves born during the year. These operations produce direct revenues for the farm which totalled approximately \$US 1,500,000 in 1973/74. The capital investment of \$16,800,000 in the farm was amortized long ago. The operation and maintenance costs of the farm are reduced considerably by the revenues which it produces. The costs and revenues are summarized in table 5. The net annual cost of the system is \$0.012/m³ of waste-water treated: equivalent costs for treatment by conventional systems would be several times as great. As a result, substantial savings are enjoyed by the people of the Melbourne area because of the farm operations. The over-all benefit-cost ratio does exceed unity.

Table 5. Melbourne and Metropolitan Board of Works Werribee Farm Summary of Costs (1974 Estimates in US dollars)

Construction (initial costs paid off)	
Operation and maintenance	\$ 4,044,000
Farm revenues (gross)	\$ 1,493,510
Net annual cost	\$ 2,549,990
Net annual cost	\$ 0.012/m ³

Environmental effects

Since its inception, the farm has had a resident population which has varied from 67 to 500. The health of these people has been similar to that of any other population of the area. No epidemics or disease have occurred, and the livestock on the farm have thrived. There have been some complaints of odour from the farm. These complaints are relatively infrequent and the degree of offense has been minimal. Odour resulted from overloading of the system as the strength and volume of the raw waste-water increased, coupled with occasional management laxness.

The vastness of the farm's operations has provided an open space buffer area for Melbourne. The lagoons at the farm have also developed into an outstanding year-round bird sanctuary. In the summer months, when inland feed and water sources dry up and birds from the northern hemisphere leave their harsh winters behind, the bird population at the farm exceeds 100,000. The farm staff has developed an intense pride in the bird life and welfare. The wildlife sanctuary which the farm provides is an example of how agriculture and waste treatment can work harmoniously with nature.

There have been no reports of ground-water contamination. Application of effluent irrigation has helped provide a fresh-water barrier to the saline water of the adjacent Port Phillip Bay.

3. Muskegon County, Michigan System (8)

The Muskegon County waste-water system has brought 2,266 hectares of previous wasteland into productive irrigated agriculture. The agricultural aspects of the project and the high level of treatment have resulted in an economically productive and environmentally sound project. For each acre-foot (1,233.5 m³) of irrigation water applied to the land, the regional net benefits amount to \$US 62.74. The benefit-cost ratio is currently 1.53:1.00. The annual benefits include direct revenues of \$706,000 from sales of corn grain. The annual benefits arising from the basic employment of farm workers are \$1,400,000 per year. A savings of \$5,716,000 per year is also realized since conventional waste-water treatment facilities which would otherwise have been necessary have not been built.

Substantial secondary benefits include improved aquatic habitat, improved industrial siting potential and general public awareness. Dollar values for these benefits have not been included in this analysis.

Description of the system

Waste-water is collected from 13 municipalities and 5 major industrial sources. Approximately 65 per cent of the wastes currently treated are from industrial sources.

The volume of wastes treated averages 37,267,000 m³ per year. As the waste collection system is expanded and growth occurs, this volume will increase to approximately 58,000,000 m³ per year.

Waste-water is pumped approximately 10 miles from the urban centre to the irrigation site through a force main. At the treatment site, the waste-water is first biologically treated. Following this treatment, the waste-water is either applied immediately to the land or stored for later use. All water is chlorinated prior to irrigation as required by State authorities.

The major statistics of the irrigation operation are summarized in table 6. The annual application of waste-water far exceeds the irrigation requirement for corn in this area because the project is a combination waste-water treatment and irrigation project. The over-all economics of the project have, at least in the short term, dictated the high waste-water application rates. The soil at the site is sandy and was considered to be non-productive prior to the waste-water irrigation project. In 1975, the average yield of corn for the waste-water irrigation project was 5.2 m³/ha. Although this nearly matched the average yield of 5.7 m³/ha, it is felt that yields of 10.5 m³/ha may be obtained as

Table 6. Muskegon Waste-Water Irrigation System - Summary of irrigation system parameters

	Amount	
	Metric	English
1975 annual waste-water supply	37,267,000 m ³	30,200 acre-feet
Capacity annual waste-water supply	58,000,000 m ³	47,000 acre-feet
1975 usable waste-water supply	37,267,000 m ³	30,200 acre-feet
Gross irrigation site area	3,035 ha	7,500 acres
Usable irrigation site area	2,266 ha	5,600 acres
Average seasonal rainfall (April-October)	49 cm	19.3 inches
Seasonal rate of application	136 cm	4.45 acre-feet/acre
Size rotating irrigation rigs	14-57 ha	35-141 acres
Number of rotating rigs	54	

operational experience is gained with the waste-water system.

Ground-water levels at the irrigation site prior to construction varied from less than 1.5 m in most places to 7.6 m. Perforated polyethylene pipe was installed to assure at least 1.5 m of freely draining aerobic soil throughout the site. The drainage network discharges to open channels which carry the clean water to natural waterways. Monitoring of discharge within the site is provided by a network of 272 observation wells scattered throughout the property.

System costs and revenues

The system costs and annual revenues for the Muskegon system are shown in table 7. The cost of construction for the treatment system was \$US 37,700,000. The operation and maintenance costs for the system are \$1,822,000 per year. Labour costs make up approximately 35 per cent of these annual costs.

The fertilizer value of the waste-water is an important component of the project. It has been estimated that 60 per cent of the nitrogen, 70 per cent of the phosphorus and 100 per cent of the potassium removed from the combined domestic and industrial wastes actually served as fertilizer for the 1975 corn crop. In early 1976, these chemicals were worth more than \$190,000 per year.

The irrigation component of the system is the prime source of revenue. In 1975 this amounted to \$706,000. In future years, these revenues are expected to increase to approximately \$1,400,000 when experience is gained in the operation of the agricultural portions of the system. The capital construction is

Table 7. Muskegon Waste-Water Irrigation System-summary of costs

Construction (including land cost)	\$37,700,000
Operation and maintenance (1975)	\$ 1,822,000
Total annual cost ^a	\$ 5,380,000
Total annual 1975 direct revenues ^b	\$ 923,000
Net annual cost ^c	\$ 4,457,000
Net annual cost ^c	\$0.12/m ³ (\$0.45/1,000 gal)

^a Based upon debt retirement over 20 years at 7 per cent interest.

^b Revenues include approximately \$216,400 in grants, laboratory services and other miscellaneous revenues.

^c After more operational experience is gained, a corn crop yield of 10.5 m³/ha is estimated. Furthermore, when full design flows of 58,000,000 m³/yr are realized, net annual costs will increase by about \$500,000, resulting in a net annual unit cost of \$0.09/m³.

amortized at 7 per cent over 20 years. After consideration for amortization, operation and maintenance, and direct revenues, the net annual cost of the system is \$4,457,000 per year, or \$0.12/m³ of water treated. When the system is operating at full capacity, these treatment costs will be reduced to approximately \$0.09/m³. The estimated cost of treating waste-water to a lesser degree by conventional treatment systems in this area is approximately \$0.15/m³. When the system is fully developed, an annual savings of \$0.07/m³ may be realized.

The costs of agricultural production are similar to those of any other public irrigation project of this magnitude in the area. The only benefit identified under the agricultural category is the revenue received from the sale of the corn grain harvested. The revenues received in 1975 fall short of the potential revenues expected in subsequent years. In the future, these revenues are expected to double, whereas the cost of agricultural production will increase only approximately 20 per cent for the same period. Secondary benefits normally associated with agricultural products were not included in this analysis. A limited special category, however, has been included because it has special meaning for waste-water irrigation projects. This benefit is known as basic employment, as discussed previously.

In the Muskegon system, special efforts were made to convert workers to agricultural employment. These workers represent approximately one third of those employed by the entire system. Using the multiplier factor of 8 for identifying regional national benefits, this results in a net benefit of \$1,400,000 per year.

The over-all environmental enhancement of the Muskegon area has been the most visible benefit of the system. To date, three positive environmental impacts have emerged: a general improvement in water quality

in Muskegon County; increased wild-life populations at the irrigation site, and increased aquatic life in Muskegon Lake. These benefits manifest themselves in various forms. Visual improvements in Muskegon Lake's water quality have increased the over-all pride of the local citizenry in their environment, tourist trade, stocking of more sensitive and desirable fish species in the lake and fishing activity, and has created an over-all improvement in the quality of recreational experiences in the area.

The waste-water irrigation system is also viewed by local public officials as an important resource in the improvement of Muskegon County. The improved quality of Muskegon Lake has encouraged the City of Muskegon and private interests to redevelop the lake's waterfront as the focus for downtown redevelopment and community revitalization. Various programmes for attracting industry and over-all economic development of the area stress the capabilities of the waste-water irrigation system.

Monitoring of the ground-water irrigation system at the Muskegon facility shows it to be of high quality with no measurable salinity increase. Pollutants have not degraded the ground-water quality.

4. Sonnenberg-Sterling, Colorado System(9)

The Sonnenberg-Sterling Irrigation Project would use 3,947,700 m³ per year of waste-water to irrigate 530 hectares of present sand hill prairie land for production of corn grain. This project is small, but the relative economic impact on the region would be substantial. The annual benefits include: (a) cash crop, corn grain production of \$US425,800 per year based on 11.3 m³/ha yield; (b) basic local employment for farm workers of \$140,000; and (c) savings of \$479,700 in waste-water treatment which would otherwise be necessary in the Sterling, Colorado area. (This project was first conceived in 1970 with detailed planning commencing in 1975. The project as described herein is a private enterprise system designed as an agricultural enterprise with costs based on economic agricultural construction techniques and actual bids. The project will probably not be constructed as described for institutional reasons. A federally subsidized waste-water irrigation project is anticipated.)

This waste-water irrigation system is unusual in the sense that the financing of the system would be undertaken in a partnership between private interests and government agencies. In this case, the desire to irrigate additional lands is the prime motivating force in the project development. The need to irrigate additional lands, when combined with the waste-water treatment needs in the area, has resulted in the preferred alternative of irrigation with waste-water and achievement of clean water goals.

The first step in the Sterling plan is the collection and transport of the domestic and industrial waste-

water flows of the area to a site approximately 4 miles east of the city. At the site, aerated lagoons are used to pretreat the waste-water to avoid nuisance conditions. The nutrient-rich stabilized waste-water is then stored for use as an irrigation and fertilizer supply. Rotating rigs are used to irrigate the crop land.

Description of the system

Included in the system would be wastes from three sources: (a) domestic wastes from the town of Sterling, (b) industrial wastes from the Sterling factory of the Great Western Sugar Company; and (c) industrial wastes from the Sterling, Colorado Beef Company. Industrial wastes represent approximately 60 per cent of the total irrigation supply.

Following biological treatment in the aeration cell, the effluent would be discharged to a storage basin. Since the normal irrigation season lasts only from mid-April to mid-October, it would be necessary to store approximately a six-month volume of waste-water. The storage basin also provides for additional treatment since the solids remaining in the waste-water will settle out. At the time of withdrawal from the basin, the treated waste-waters are disinfected with chlorine prior to irrigation. After accounting for evaporation and minor seepage losses, about 3,580,000 m³ would be available for irrigation. The irrigation land would consist of about 530 ha in the area of the treatment and storage basins. The waste-water would be distributed for irrigation by 10 circular electric-driven irrigation rigs. Each rig is capable of irrigating 53 ha and could be expanded in the future as needed to include corner systems capable of irrigating an additional 10 ha each.

The primary crop grown would be corn grain for cattle-feeding purposes. Flexibility remains in the design for irrigation of alfalfa, if necessary, by some of the rigs. The soil texture at the irrigation site is sandy. Sprinklers are the only practical method of irrigation; pivot sprinklers are ideally suited for this purpose. The design application rate is 67.5 cm per year.

The use of sewage effluent assures that nitrogen would be applied frequently and in small amounts. Allowing for some loss of nutrients, about 280 kg/ha of nitrogen and 67 kg/ha of phosphorus would be applied. Unknown quantities of trace elements would also provide fertilizer value to irrigation water. The expected initial yields of the system are 11.3 m³/ha. As the organic content of the soil increases through waste-water application and the plowing in of sludges collected in the storage basins, the expected yields would increase to the 13 m³/ha range.

The major parameters of the irrigation portion of the Sonnenberg-Sterling system are summarized in table 8.

The soils of the area are well drained with ground-water 25 m or more below the surface. The natural

Table 8. Summary of irrigation system parameters - Sonnenberg-Sterling Waste-water Irrigation System

Item	Amount	
	Metric	English
Annual waste-water supply	3,947,700 m ³	3,200 acre-feet
Usable waste-water supply	3,580,000 m ³	2,900 acre-feet
Gross irrigation site area	688 ha	1,700 acres
Usable irrigation site area	530 ha	1,310 acres
Average seasonal rainfall (15 April-15 October)	30.5 cm	12.0 inches
Seasonal rate of application	67.5 cm	26.6 inches
Size rotating irrigation rigs	53 ha	131 acres
Number of rotating rigs	10	

drainage characteristics of the site would allow ample movement of the percolated water to the South Platte River approximately 5 km to the north.

System costs and revenues

The estimated total construction cost of the Sonnenberg-Sterling system is estimated at \$2,441,000. The annual operation and maintenance costs of the system are estimated to be \$271,000.

The projected annual revenue for the waste-water irrigation system would develop only in the irrigation component. These revenues develop from the sale of the corn crop harvested. Based on a projected initial yield of 11.3 m³/ha, these revenues would total \$425,800 per year, but would vary depending upon actual yields of the system and the prevailing market prices. As experience is gained in the operation of the system and the organic content of the soil improves, a general upward trend in these revenues can be expected.

The costs and revenues of the Sonnenberg-Sterling system are summarized in table 9. Capital construction costs are amortized at an interest rate of 7 per cent over a 20-year pay-back period. Financing of the capital construction costs is anticipated to be through industrial revenue bonds. If other methods of financing were available via municipal bonds or federal funding at lower interest rates, lower annual costs could be achieved.

After consideration is made of the direct revenues produced by the sale of corn, the net annual costs of the system would be \$75,200 per year. This represents a cost of \$0.02/m³ of waste-water treated. For com-

parative purposes, a conventional system which would provide similar water quality in the same area would be approximately \$0.12/m³. Thus, an initial savings of \$0.10 per m³ of waste-water treated would be realized immediately.

Table 9. Sterling-Sonnenberg System-summary of costs

Construction	\$ 2,441,000
Operation and maintenance	\$ 271,000
Total annual cost	\$ 501,000
Total annual direct revenues	\$ 425,800
Net annual cost	\$ 75,200
Net annual cost	\$ 0.02/m ³ (\$0.07/1,000 gal)

The designation of benefits has been divided into four general categories. The waste-water treatment costs are those involved in the transport to, and pretreatment of, the wastes at the irrigation site. Since the storage basin provides treatment in addition to storing flows during the winter non-irrigation season, half of the construction cost (\$303,100) was allocated to agricultural production. The regional benefit of \$479,700 assigned to waste-water treatment is the estimated cost of providing treatment by a more conventional alternative. This benefit can vary substantially depending upon local stream quality problems. In the Sterling area sulphates and nitrogen are emerging problems in the water supplies. The estimated equivalent treatment cost includes provision for nitrogen removal only.

The cost of conventional treatment is considered a benefit to the Sonnenberg system since it represents a regional investment which would be necessary in the absence of the waste-water irrigation project.

Additional benefits for over-all environmental enhancement, such as water recreation and wild-life habitat, have not been quantified.

The annual cost of agricultural production includes provision for harvest machinery, supplemental fertilizers and herbicides, irrigation equipment, etc. The benefits identified with agricultural production include only the direct revenues associated with the sale of the corn crop. They do not include the secondary regional benefits sometimes associated with the sale of agricultural products, which typically range in the order of 50 per cent of the direct revenues. The benefits also do not include intangibles such as the enhancement of local cattle feed supplies for local feed lots, nor the development of a firm irrigation water supply.

Summary

Due to the law passed by Congress recently, the rules and regulations of the Environmental Protection Agency, and the need to optimize federal funding, it

is necessary to consider land treatment when planning and designing new sewage treatment facilities. Items to be weighed in determining the appropriateness of choosing a land treatment approach include site characteristics such as soil conditions, geology, topography, proximity to water, and climate. If the land treatment approach is within 15 per cent of being the most cost effective, it will probably be selected. The decision must be made as to which method to use: irrigation, overland flow, or rapid infiltration. An evaluation must also be made of the aquifers and their properties so that potential problems can be identified and appropriate preventative action taken.

A monitoring programme is essential for land treatment systems so that awareness is maintained as to the actual quality of effluent being produced and the first indications of potential effects on ground and surface waters, crops and soils.

The application of treated waste-water to land can provide an economical and environmentally viable alternative to conventional waste-water treatment.

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SELECTIVE INFORMATION SECTION*

* Most of the abstracts reproduced below are from the Selected Water Resources Abstracts of the Water Resources Scientific Information Center, Office of Water Research and Technology, United States Department of the Interior, for which acknowledgement is hereby gratefully recorded.

Subject	Source	Description
Conservation in agriculture	P.J. Rathwell and R.F. Leyden, "Cost comparison of drip and flood irrigations systems", <i>Journal of the Rio Grande Valley Horticultural Society</i> , vol. 30 (1976), pp. 79-86	Drip irrigation and conventional surface flood irrigation for citrus orchards are compared with respect to installation and operating costs. Observations were made at an experimental citrus centre in the Lower Rio Grande Valley of Texas. The results are presented. Drip irrigation provides a substantial savings of water in newly planted orchards, but as trees grow, water requirements are about the same under either drip or flood irrigation. The investment costs are comparable for both systems. The savings associated with a drip system are achieved during the first years of an orchard's existence. The labour involved in maintaining and cleaning the drip system is likely to be comparable to the irrigation labour required in a levelled orchard. Electrical costs may run high if the drip system is not engineered to deliver the required amount of water at a minimum electrical usage.
Conservation in agriculture	G.D. Thompson, "Irrigation of sugar cane", <i>South African Sugar Journal</i> , vol. 61, No. 3 (March 1977), pp. 126-131	The purpose of this review is to collate the pertinent available information, to assess the adequacy of the present state of knowledge, and to indicate the aspects of irrigation research that appear to most warrant further investigation. Within the South African sugar belt it is possible to discriminate between areas where irrigation is used to increase yields obtainable under rainfed conditions, and areas where irrigation is necessary to guarantee continuous sugarcane production. It has become traditional to refer to the former as areas requiring "supplementary" irrigation, and to the latter as requiring "total" irrigation. The decision to install a supplementary irrigation scheme in the rainfed areas is unfortunately seldom an easy one to make. Capital and running costs in relation to the value of the extra cane produced have always been such that profitability has been marginal, and most of the schemes which have remained in operation have been on miller-cum-planter estates where milling profits can be used to make irrigation more worth while, and on fields as close as possible to the mill itself so that transport costs for the increased crop can be kept to a minimum.
Cost sharing	R.M. North and W.P. Neely, "A model for achieving consistency for cost sharing in water resources programmes", <i>Water Resources Bulletin</i> , vol. 13, No. 5 (October 1977), pp. 995-1005	Three basic principles of responsibility have influenced the Federal/non-Federal cost-sharing rates for water resources programmes: (1) full payment by beneficiaries; (2) exclusive Federal assumption of costs; and (3) joint Federal/non-Federal sharing. The efforts to determine appropriate cost-sharing rates have resulted in several hundred complex arrangements involving contributions, user charges and direct sales based on many variations of payment terms. This is expressed in a basic present value model developed to determine the non-Federal water resources programmes and projects for both implementation and operation, maintenance and repair (OMR) stages. The model introduces the concept of a composite (implementation plus OMR) cost share as a focus for developing appropriate resources investments. The model can be used as a focus for policy decisions on cost-sharing which seek to

Subject	Source	Description
Data acquisition	P.A. Castruccio, H.L. Loats, T.R. Fowler, and P. Robinson, "User requirements and user acceptance of current and next-generation satellite mission and sensor complement, oriented toward the monitoring of water resources", National Technical Information Service, Springfield, VA 22161 (No. N76-1552, 15 December 1975)	achieve consistent and equitable cost-shares for the purposes provided while maintaining an efficient allocation of resources within water programmes. Principal water resources users were surveyed to determine the applicability of remotely sensed data to the user's present and future requirements. Analysis of responses was used to assess the levels of adequacy of LANDSAT 1 and 2 in fulfilling hydrological functions and to derive systems specifications for future water resources-oriented remote sensing satellite systems. The analysis indicated that water resources applications for all but the very large users require: resolutions of the order of 15 metres; number of radiometric levels of the same order as currently used in LANDSAT 1 (64); number of spectral bands not in excess of those used in LANDSAT 1 (4); and repetition frequency of the order of two weeks. The users had little feel for the value of new sensors: thermal IR, passive and active microwaves. What is needed in this area is to achieve specific demonstrations of the utility of these sensors and submit the results to the users to evince their judgement. All users indicate that the most significant information requirements are in the area of better knowledge of the characteristics of precipitation, specifically, the temporal behaviour (intensity versus time) of rainfall, its areal distribution, the statistics of succession of rain events as a function of time, and the storm travel characteristics.
Data acquisition	R.A. Sutherland and J.F. Bartholic, "Significance of vegetation in interpreting thermal radiation from a terrestrial surface", <i>Journal of Applied Meteorology</i> , vol. 16, No. 8 (August 1977), pp. 759-763	The regions between crop rows were modelled as infinitely long diffuse cavities. Geometrical view factors were calculated, accounting for reflected radiation emanating internal to the cavity and from the background sky. A "cavity" emissivity dependent on local geometry was defined to allow for correcting apparent temperatures to true temperatures. The total emissivity appropriate for correcting aircraft thermal data was calculated then by averaging all emissivity components to account for soil, crop and background. It was shown that even for the lowest crop and vegetation emissivity is greatly increased, giving rise to a decreased error in remotely sensed temperature data.
Ecological impact of water development	J.A. Diemer and N. Wengert, "Water for energy: an approach to comprehensive impact assessment", <i>Water Resources Bulletin</i> , vol. 13, No. 5 (October 1977), pp. 885-893	The effects of energy development on the water resources of the Colorado River and Great Basin regions are expected to be substantial. Complex physical, economic and institutional interactions may be expected. Most research on these impacts appears single-purpose, fragmented, unco-ordinated, and often inaccessible to potential users, particularly to those with responsibility for energy/water policy and programme decisions. A comprehensive, integrative framework for assessing alternative water allocation decisions is outlined, with a heuristic decision-making model for evaluating impacts on maximization of gross (or net) regional product and regional social welfare, and for assessing the region's contribution to national economic objectives. The suggested model provides a structure for application and

Subject	Source	Description
Ecological impact of water development	R.J. Pitchford and P.S. Visser, "The effect of large dams on river water temperature below the dams, with special reference to Bilharzia and the Verwoerd Dam", <i>South African Journal of Science</i> , vol. 71 (July 1975), pp. 212-213	integration of data of various kinds to a range of situations arising from possible impacts from energy proposals. The focus is on water/energy relationships but the model may provide a framework for comprehensive analysis of a variety of environmental actions and resulting system perturbations and effects. The majority of large dams are constructed in such a way that the normal water outflow from them into the rivers below is from sluices below the water surface level of the dam. Depending on the depth below surface level, temperatures of the outflowing water might be very different from the normal water temperatures existing in comparatively shallow rivers. The effect of water temperature changes on fauna and flora ecology below the dam might be apparent for long distances downstream. Water temperature plays a vital role in Schistosome transmission (1) in permitting a suitable snail population to flourish and (2) in controlling the length of the incubation period of the parasite in the snail. Numerous situations might therefore arise which could alleviate or aggravate either the snail or the parasite population, or both, as a result of a permanent change in water temperature over large areas. Possible changes in the Orange and Fish Rivers due to the existence of the Verwoerd Dam are studied.
Ecological impact of water development	Q.D. Stephen-Hassard and E.M. Grabbe, "Hawaii and the Manganese nodule industry", <i>Oceans '77</i> , Proceedings of the Third Annual Conference held at Los Angeles, California, 17-19 October 1977, vol. 2 (1977)	The State of Hawaii is located near the centre of rich manganese nodule deposits containing nickel, copper and cobalt of commercial value. The State has followed the early research, exploration and pilot mining activities of various companies and late in 1976 began a project to determine the economic feasibility and the socio-economic and environmental impacts of establishing a manganese nodule industry in Hawaii. The project will address the concerns of the people of Hawaii in these impact areas and will recommend a course of action. The University of Hawaii has been engaged in research, exploration, deep ocean mining tests and ocean environmental studies of manganese nodules during the past decade. The common interests of the State, the University of Hawaii and industry have led to several joint assessments. The project includes the following tasks: economic impact assessment, analysis of ocean transportation systems, analysis of processing systems, physical criteria and description of processing activities, metals extraction process chemistry, manpower supply and training, environmental law analysis, environmental evaluation, and waste disposal on land and agricultural potential of manganese nodule tailings.
Ecological impact of water development	M.L. Warner, J.L. Moore, S. Chatterjee, D.C. Cooper and C. Ifeadi, "An assessment methodology for the environmental impact of water resource projects", National Technical Information	This report presents technical materials intended for use in reviewing environmental impact statements (EIS) on major reservoir construction projects. Methods and materials for determining the completeness and accuracy of EIS are discussed, with special emphasis on water quality and ecological impacts. The report contains six

Subject

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Service, Springfield VA 22161,
(No. PB-240 002, July 1974)

related but individually referenced discussions that address: (1) reservoir project planning, construction, and operation activities; (2) water quality impacts of reservoir construction; (3) ecological impacts of reservoir construction; (4) economic, social and aesthetic impacts of reservoir construction; (5) review criteria for assessing general statement completeness and accuracy; and (6) a review of impact assessment methodologies. Important issues or potential impacts that might be found in an adequate EIS are presented. In addition, the water quality and ecological impacts sections discuss the site-specific conditions under which a given potential impact may or may not occur. The section on water quality impacts also presents a detailed comparison of mathematical models for predicting impacts on water temperature, dissolved oxygen levels, and some chemical constituents of surface waters. The sections dealing with water quality, ecological, and economic-social-aesthetic impacts include extensive citations of relevant literature. This study is applicable to the full range of environmental conditions in which reservoirs may be constructed.

Effects of pollution

R. Engle, "Relationship of marine pollution to human health", *Proceedings of the International Symposium on Marine Pollution Research*, held at Gulf Breeze, Florida, 27-29 January 1976 (Environmental Protection Agency, Office of Research and Development Report No. EPA-600/9-76-032, January 1976)

Some toxic substances, carcinogenic compounds or biological agents are concentrated in invertebrates and lower vertebrates, suggesting the possibility that these compounds could be transferred through the food chain to humans. A good example of biological magnification occurred when Japanese fishermen developed mercury poisoning from consuming fish from Minamata Bay. Superior methods must be developed to screen new chemicals for toxicity, especially since less than one half of the new chemicals that go into major production are screened for carcinogenicity. The development of marine biomedicine will not be realized unless biomedical scientists, knowledgeable about human health problems, learn more about marine biology. Similarly marine biologists knowledgeable about the great variety of creatures of the sea must learn more about biomedical problems and needs. Both will suffer if scientists fail to initiate integrated studies of the marine biota and human health.

Effects of pollution

C.C. Coutant, "Thermal effects on fish ecology", *Encyclopedia of Environmental Engineering*, vol. 2 (W. and G. Baird Ltd., Northern Ireland, 1976), pp. 891-896

A general review of the present knowledge of the thermal effects on fish ecology is presented which includes information on temperature as a lethal agent, as a stressing factor, as a controlling factor, as a limiting factor, as a masking factor and as a directing agent. It is concluded that temperature is probably the pre-eminent master factor in the lives of fish and that no study of fish ecology would be meaningful without consideration of thermal relationships. It is said that while, within limits, fish possess effective mechanisms for adapting to thermal changes, man must be careful not to exceed these limits if he wishes to preserve a productive commercial and recreational fishery.

Subject	Source	Description
Erosion and sedimentation	S.S. Baydin, "Possible effect of sediments and channel processes on run-off redistribution in a river delta", <i>Soviet Hydrology</i> , Selected Papers, No. 4 (1975), pp. 234-242	All channel forms in the mouths of rivers are associated with types of bed-load transport produced by the energy of the flow. Therefore, when investigating channel processes one should proceed from the energy characteristics of flow and the types of bed-load movements and not from the forms of channel formations and geomorphological relations. In this case, the initial data must include: flow, the particle size of bottom deposits and sediment concentration, the slope of the land (valley) and its ratio to the slope of the water surface, and the ratio between the water slope during the flood and low-flow periods. A stream with a high flow energy does not meander and selects the shortest and straightest direction. Sediment transport is achieved in these reaches in the smooth stage during flood rise and in the structural bottom stage during flood recession and the low-flow period. With a decrease in slope and when flow energy is inconsistent with the particle size of the sediment, the flow can successively concentrate its energy in individual reaches, periodically moving the sediments from one reach to the other in the course of the year. The main types of structural sediment movement are: ribbon dune (riffle), midstream bar and side bar; and of structureless movement, continuous traction and sliding.
Erosion and sedimentation	R.F. Luque, "Erosion and transport of bed-load sediment", National Technical Information Service, Springfield, VA 22161 (No. N75-27298, 1974)	The results were presented of a series of experiments in which were measured: the mean critical bed-shear stress at SHIELDS' grain-movement condition and at the initiation of non-ceasing scour, the rate of bed-load transport, the average particle velocity, the rate of deposition, and the average length of individual steps of saltating bed-load particles, in water, as a function of the time-mean bed-shear stress. These experiments were performed in a closed rectangular flow channel at different slopes of the bed surface and using five different bed materials (two sands, gravel, magnetite and walnut grains). A comparison of the threshold drag acting at different downward slopes of the bed surface (0, 12, 18 and 22 degrees) resulted in a surprisingly large critical-drag angle of 47 degrees. The initiation of non-ceasing scour of a loose granular bed was studied experimentally behind a consolidated bed of the same material as the loose bed. The corresponding instantaneous threshold drag was about three times larger than the threshold drag acting at SHIELDS' grain movement condition. The rate of bed-load transport measured as a function of the mean bed-shear stress satisfied a generalized MEYER-PETER and MULLER formula (1948), also at various downward slopes of the bed surface, as investigated up to 22 degrees. The rate of particle deposition was proportional to the rate of bed-load transport, and the average length of individual particle steps was a constant. This implied that the probability of a bed-load particle being deposited when striking the bed surface was independent of the flow rate within the experimental range.

Subject	Source	Description
Evaluation process	G.L. Bultena, D.L. Rogers and K.A. Conner, "Characteristics and correlates of public knowledge about a water resource development issue", Ames, Iowa State University Department of Sociology and Anthropology, 1975	Public knowledge about an environmental (reservoir) project proposed by the Army Corps of Engineers was examined. The study objectives were: (1) to determine how knowledgeable local citizens were about the proposed reservoir, for the purpose of assessing their ability to respond meaningfully to the Corps' proposal, and (2) to test the importance of several variables which were hypothesized as affecting knowledge of environmental issues including, social class, age, personal attitudes, perceptions of likely impacts of a reservoir and amount of social interaction and group involvement of persons regarding community issues. Although the project proposal had become a prominent local issue, a relatively low level of public knowledge about the reservoir existed. As hypothesized, the best informed persons were those who were (1) younger in age, (2) of higher socio-economic status, (3) more strongly opinionated on environmental issues, (4) more convinced of the efficacy of citizen actions in public affairs, (5) more conscious of likely community impacts of a reservoir, and (6) most often convinced that they were benefactors, rather than beneficiaries, of the project. The strongest explanatory variable for such knowledge was extensive previous political involvement in activities designed to influence agency decision making. Respondents who were receiving the greatest personal benefits from a reservoir were no better informed about the project than those who were anticipating few, if any, benefits. Relatively few respondents perceived themselves as deriving personal benefits from the reservoir.
Evaluation process	G.L. Bultena and D.L. Rogers, "Studies of public preferences and group interactions to guide land-use planning and control", Report presented at the Iowa State University Faculty Symposium on Land-Use Planning and Control, 1973	The role of citizen involvement in future land-use planning is discussed. An organizational-expertise decision-making model is characterized by a division of complex activities into smaller operations: these operations are performed by sub-units comprising specialists. Advantages and limitations of the model are detailed. An alternative model, the democratic-participatory model, seeks expanded citizen involvement in public environmental programmes; administration is structured so as to optimize input from citizens. Approaches to public participation, including public hearings, citizen advisory panels and public opinion polls, are outlined. The power relationships between agencies and interest groups are analysed; the need for cohesive organized group efforts by public interest groups is stressed. A brief historical perspective of public sentiment toward and citizen's priorities in the management of resources is presented.
Evaluation process	J.F. Timmons, "Guidelines for developing state and national public land-use policies", Report presented at the Conference "Toward an Effective Land Use Policy for Michigan", Kellogg	Guidelines for the development of state and public land-use policies are presented. Subjects include: (1) the need for land-use policies resulting from current land use and environmental problems; (2) the nature and scope of land-use policy and its objectives; (3) recommended shifts toward state initiatives in developing

Subject	Source	Description
	Center, Michigan State University, East Lansing, Michigan, 17 May 1973.	land-use policy; (4) recommended shifts in the control of land resources — from public interest; and (5) suggested guidelines for developing land-use policies as a continuing process. The interrelationships between land use, environmental quality, and public interest goals are emphasized. Land-use policy development procedures should include: (1) a statement and analysis of goals, economic impact and trade-offs; (2) provisions of flexibility in regulation and compliance contingent upon an area's regional problems or peculiarities; (3) encouragement of experimentation, innovation and applied research; (4) evaluation of ongoing programmes; (5) room for citizen participation in planning and implementation; (6) efficient and effective means of bringing each level of government into land-use policy, planning, programming, and performance; (7) financial incentives; (8) consideration of all current and potential uses of natural resources and their environmental effects, and (9) analysis of the impact of technological advances.
General	P.A. Castruccio, H.I. Loats, Jr. and T.R. Fowler, "The application of remote sensing to the development and formulation of hydrologic planning models", National Technical Information Service, Springfield VA 22161 (No. N76-18633, January 1976)	The launch of LANDSAT has provided water resources managers and hydrologists with broad prospects for efficient acquisition of essentially real-time data. The reduction of satellite data to practical, operational information requires a clear, easily applicable methodology for converting these data into quantitative hydrologic parameters. Summarized is the development of a model specifically structured to take full advantage of the capabilities of LANDSAT, e.g. its frequent recurrence and consequent ability to determine seasonal variations in a watershed's conditions. The effort was structured along two major routes: (1) the development of a hydrologic planning model specifically based upon remotely sensed inputs, including its test and verification from existing records; and (2) the application of LANDSAT data to supplying the model's quantitative parameters and coefficients. This first phase of the effort focused on the definition of the "drivers" — those hydrologic processes to which peak runoff is most sensitive — upon the synthesis of a simple yet effective model for the estimation of long-recurrence outflows. Next, this report describes in detail the study's second phase, which includes the development of a routing model for use in sensitivity analyses and a quantitative investigation of the accuracy and completeness of the hydrologic information which can be extracted from remotely sensed imagery.
Groundwater management	H. Meisler, "Summary of ground-water conditions in the Jaffna Peninsula, Republic of Sri Lanka, with a plan for investigating the feasibility of ground-water development", Geological Survey, Trenton, N.J. Water Resources Division, 1977	Ground water in the Jaffna Peninsula of Sri Lanka occurs within solution openings of the Jaffna Limestone of Miocene age. The fresh-water forms a complex of lenses up to 25 metres thick overlying saline water derived from the sea. Salt-water intrusion and upconing of the salt water has occurred at several locations primarily along the coast. Recharge to the aquifer occurs during October-December. Discharge is primarily to wells and to springs along the north coast. Spring discharge is small compared with withdrawal from wells. Pumping from wells in an intensively studied 142

Subject	Source	Description
Identification of pollutants	Environmental Protection Agency, "Introduction to instrumental analysis of water pollutants: training manual", National Technical Information Service, Springfield, VA.22161 (No. PB-261 318, November 1976)	square kilometre area of the Peninsula was 55.5 million cubic metres in 1976, whereas discharge to visible springs was an estimated 9.3 million cubic metres. Pumping during January-September removes water from storage, causing heads to decline and the salt water-fresh-water interface to rise. The storage is replenished as heads increase and the interface is depressed during the following October-December. Consequently, most of the recharge goes into storage rather than discharging to the sea. A training manual is presented as an accompaniment to EPA National Training Center Course 107.1, "Introduction to instrumental analysis of water pollutants." It includes the principles utilized, basic design, analytical applications, operational procedures and quality control aspects for each of the instruments most commonly used in water analysis. The instruments described are: pH meter, conductivity meter, dissolved oxygen probe, colorimeter, flame photometer, infrared spectrophotometer, atomic absorption spectrophotometer, turbidimeter, total organic carbon analyzer and gas chromatograph.
Identification of pollutants	E.D. Goldberg, "Global monitoring of marine pollutants", in <i>Proceedings of the International Symposium on Marine Pollution Research</i> held at Gulf Breeze, Florida, 27-29 January 1976 (Environmental Protection Agency Report No. EPA-600/19-76-032, January 1976)	There are several compelling reasons for initiating a continuing and systematic surveillance of already defined pollutants in coastal marine waters. First, the present exposure levels to marine organisms can be used in principle by ecologists to ascertain whether any organisms or communities of organisms are threatened. Second, environmental concentrations allow an assessment of danger to public health through the consumption of sea foods. Third, present levels allow predictions of future levels. With knowledge of present and past environmental releases of the pollutant in question and with an estimate of future leakages based upon production and use, data models for pollutant dispersion about the environment can be formulated and future levels may be foretold. Such information is vital to those responsible for management of marine resources. Where predicted levels are unacceptable on the basis of possible environmental impact, restrictions upon releases can then be imposed. There are four collectives of pollutants that may jeopardize continued use of marine resources: artificial radionuclides; petroleum hydrocarbons; chlorinated hydrocarbons; and heavy metals.
Network design	W.G. Hines, D.A. Rickert and S.W. McKenzie, "Hydrologic analysis and river-quality data programs", <i>Journal of the Water Pollution Control Federation</i> , 49, No. 9 (September 1977), pp. 2031-2041	A unified approach is described for the collection of river-quality data. River-quality sampling and analysis programmes can be dramatically improved through a de-emphasis of the routine monitoring approach and added emphasis on the following: (1) a competent analysis of the natural and man-controlled aspects of river hydrology as reflected by streamflow and water-temperature pattern and channel morphology; (2) the re-analysis of existing quality data, after their segregation into compatible temporal and spatial units, as derived from the hydrologic analysis; and (3) the use of

Subject	Source	Description
Precipitation	J. Medhi, "A Markov chain model for the occurrences of dry and wet days", <i>Geophysics</i> , vol. 27, No. 4 (October 1976), pp. 431-435	repetitive synoptic studies tailored to the environmental conditions and problems of interest in each river basin. Study of rainfall data in India began as early as 1899 with the work of Blanford. His work was extended by Sir Gilbert Walker. Mahalanobis, in his classic work <i>Sankhya</i>, V (1940), pp. 1-20, broke entirely new ground with sound statistical reasoning in his study of the rainfall, runoff and other meteorological features of the river basins of Orissa. Models based on stochastic processes and time series are now being applied in meteorological studies. Gabriel and Neumann used a Markov chain model in a study of weather conditions in Tel Aviv. A similar Markov chain model was used for the occurrence of dry and wet days in Gauhati (Airport) and to test the statistical significance of the model.
Precipitation	M.L. Shelton, "The 1976 and 1977 drought in California: extent and severity", <i>Weatherwise</i> , vol. 30, No. 4 (August 1977), pp. 139-146	Many stations in California experienced their most severe drought of this century during the 1976 and 1977 precipitation years. The unseasonable dry weather adversely affected agriculture, recreation, and water supplies throughout the State. During 1976, agriculture and the ski industry experienced large financial losses because precipitation was insufficient to support normal activities; range and forest fires burned approximately 165,000 acres of dry vegetation; and an acute water shortage in Marin County prompted one city to discourage tourists. The impact of the drought probably would have been even greater, but the state-wide system of water shortage and transfer was able to compensate for natural water shortages by providing water to many affected areas. Moisture deficits at the seven stations selected as representative of various climatic regions in California indicate that the 1976 drought was more severe at a majority of these sites than the record dry year drought of 1924. Only the south coastal area represented by Los Angeles experienced a more severe drought during 1924 than during 1976. The state-wide drought pattern suggested by the data for the representative stations is that the 1976 drought appeared in the State earlier than the 1924 drought, but it spread throughout the State more slowly than the 1924 drought.
Precipitation	N. Tripathi, "Influence of certain factors on rainfall frequency values", <i>Indian Journal of Meteorology, Hydrology and Geophysics</i> , vol. 27, No. 4 (October 1976), pp. 423-430	Based on 84-year data of Calcutta, Delhi, Bombay, and Madras, it was found that to estimate the maximum one-day point rainfall for long return periods, more reliance is to be placed on stations with the longest records. For the error to be within plus or minus 25 per cent in about 80 per cent of cases, in the estimation of return period values, extrapolation may be made to five times the period of record and to ten times the period of record if the outliers are excluded from the series. Criteria to find the outliers were suggested. Some evidence was found to show that the return period values of rainfall of a station increase in air pollution at that station.

Subject	Source	Description
Sources of pollution	G.J. Kelly, "Ground-water quality and corrosion: the Australian scene", in <i>Groundwater Quality - Measurement, Prediction and Protection</i> , Proceedings of the Water Resources Centre Conference, 6-8 September 1976, Berks, England, University of Reading, 1976	The general aridity of the Australian continent make its ground-water resources especially valuable and heavily used for water supply. Increasing concern by pump owners about unsatisfactory and unpredictable performance due to corrosion has highlighted the need for more accurate characterization of groundwater quality, particularly with respect to "unstable" variables which are primarily dependent on the partial pressure of oxygen and carbon dioxide. In addition, Australian ground waters are generally dominated by sodium and chloride, or sodium and bicarbonate, so that for the same conductivity and pH, they are more corrosive than the ground waters of Europe and North America for which rules-of-thumb for pump materials selection have been developed. Use of alternatives to cast iron and steel for various pump components could prove to be a major cost-saving tactic in the long run: austenitic stainless steel is highly promising despite considerable initial cost. Pump column corrosion appears to be as much a design problem as anything else. Some form of cathodic protection may ultimately be the best solution for such difficulty.
Specialized information centre services	J.W. Spaven, "The International Crops Research Institute for the Semi-arid Tropics", <i>Agricultural Administration</i> (Hyderabad, India), vol. 4, No. 1 (January 1977), pp. 49-55	The International Crops Research Institute for the Semi-arid Tropics (ICRISAT) was founded in 1972 as one of the nine international agricultural research groups operating under the Consultative Group of International Agricultural Research. The purpose of ICRISAT is to focus research on improving the principal food crops and farming systems of the semi-arid tropics, identify barriers to improvement, and supply findings to 48 participating local government agencies which develop recommendations for farmers. Initial efforts concentrated on India and the semi-arid nations of Africa. Crop improvement efforts focused on the following major food items crucial to local diets: sorghum, millet, pigeon pea, chick pea, and groundnut. Farming systems able to be broadly used, yet appropriate for making optimum use of a region's land and water are emphasized in ICRISAT's farming systems programme. The organization also emphasizes short-term, in-service training.
Waste treatment processes	R.L. Carpenter, M.S. Coleman and R. Jarman, "Aquaculture as an alternative waste-water treatment system", <i>Biological Control of Water Pollution</i> , (Philadelphia, University of Pennsylvania Press, 1976)	The use of aquaculture to upgrade waste treatment lagoons while producing a valuable by-product is being studied in a six-cell, serially operated experimental lagoon system. Fish were already present in the first two cells receiving conventional aerated treatment. The four non-aerated cells were variously stocked with channel catfish, golden shiners, fathead minnows, and Tilapia Nilotica. The secondary treatment standard for 5-day biological oxygen demand was met in the effluent from the second cell; standards for suspended solids and fecal coliforms were met in the effluent of the fifth cell. Removal of nitrogen and phosphorus was excellent. No pathogens were found in waste-water beyond the first two cells nor in any of the 179 fish sampled. Biomass

Subject	Source	Description
Waste treatment processes	R. Dinges, "A proposed integrated biological waste-water treatment system", <i>Biological Control of Water Pollution</i> , (Philadelphia, University of Pennsylvania Press, 1976)	increases were: 1.8 to 76 kgs for <i>Tilapia nilotica</i>; 270 to 1,800 kgs for channel catfish, 38 to 243 kgs for golden shiners. When operated in the absence of fish, effluent quality was lower and the suspended solids standard was not met. The proposed system intended to correct the deficiency of stabilization pond effluent quality consists of four serially-operated treatment ponds. Stabilization pond effluent in which original organic matter has been reduced by bacterial action and converted to algal cells will be passed through a pH reduction filter and into the proposed unit. The first pond will contain water hyacinths and duckweed; scuds will be abundant. Expected results are mineral nutrient uptake, reduction of hardness and total dissolved solids, denitrification, and suppression of algal growth. Results expected of the second pond, devoted to zooplankton culture, are clarification, organic and coliform reduction, and mineralization and mineral nutrient uptake. The third pond will contain larger invertebrates such as glass shrimp. Expected results are biomass conversion to a larger life form, nutrient uptake settling, and minimal organic reduction. Results of the fourth pond, which will contain fish, are biomass conversion to a larger life form, settling, and minimal organic reduction. By-product production may help offset the cost of treatment.
Waste treatment processes	R. Patrick, "The role of aquatic plants in aquatic ecosystems", <i>Biological Control of Water Pollution</i> , (Philadelphia, University of Pennsylvania Press, 1976), pp. 53-59	Aquatic plants enrich aquatic and wetland ecosystems by fixing carbon and giving off free oxygen during photosynthesis. They also provide shelter for aquatic organisms. In the growth of aquatic plants various nutrients are removed from the water. Nutrients may be accumulated in excess of what is needed for growth. Significant amounts of heavy metals are also accumulated. Nutrients and trace metals are stored in plant tissues and are returned to the aquatic ecosystem as food or detritus. In the case of emergent vegetation, they may be dispersed into the terrestrial ecosystem. Wetlands are important for the production of various substances essential for the aquatic ecosystem. An example is the production of vitamin B12 by fungi and bacteria in swamps.
Waste treatment processes	Joachim Tourbier and Robert W. Pierson, Jr., eds., <i>Biological Control of Water Pollution</i> (Philadelphia, University of Pennsylvania Press, 1976), p. 340	In the conference on biological control of water pollution, scientists, environmental experts and city planners from the Federal Republic of Germany, the Sudan, the Netherlands, Finland, Romania, the United States and Puerto Rico discuss how biological systems may be utilized to deal with water pollution problems. Papers are presented suggesting that green plants and biological systems have the capacity to detoxify dangerous synthetic chemicals in industrial wastes and that vegetation can capture nutrients and be harvested directly as food for man and domestic animals or used for paper manufacture or composting. More complex systems are also presented in which food chains are reconstructed from nature, beginning with green plants and phytoplankton and ending with animals of economic value. Biological

Subject	Source	Description
Waste treatment processes	B.C. Wolverton, R.M. Barlow and R.C. McDonald, "Application of vascular aquatic plants for pollution removal, energy, and food production in a biological system", <i>Biological Control of Water Pollution</i> (Philadelphia, University of Pennsylvania Press, 1976), pp. 141-149	systems are discussed which rely on forest, marsh or crop vegetation, together with soil micro-organisms, to improve the quality of aquifer recharge water. A 0.40 ha water hyacinth wetland has the potential for removing over 1,590 kg of nitrogen and over 360 kg of phosphorus annually from sewage effluent absorbing and metabolizing over 70 kg of phenol every 72 hours from phenol-polluted water and removing over 120 gm of trace heavy metals daily. Under favourable conditions, 0.40 ha of water hyacinth has the potential of producing over 65 tons of dry plant material annually. This can be converted, through anaerobic decomposition, to over 28,000 cu m of biogas; a high grade fertilizer is produced as a by-product. Water hyacinths may, eventually, be used as food for cattle and even man. Field demonstrations using a chemical waste lagoon and a municipal sewage lagoon are in process. Processing equipment, including scaled-up laboratory models of biogas generating units, is being developed.
Waste treatment processes	"Effective textile industry effluent treatment", <i>International Dyer and Textile Printer</i> , vol. 157, No. 4 (February 1977), p. 184	Dyeing processes in the textile industry often result in surges of highly toxic waste which can upset conventional waste-water treatment systems. The Whitehead and Poole oxidation ditch system is based on the completely mixed, rapid dispersion principle and is designed to accommodate a high sludge: organic load ratio. The rapid dispersion results in rapid transfer of oxygen throughout the tank. The manufacturers report that the Whitehead and Poole oxidation ditch system can produce an effluent which meets the British Royal Commission standards of 20 mg BOD/litre and 30 mg suspended solids/litre. A compact aeration system which operates on the same principles as the oxidation ditch but is contained within a vertical structure of steel or reinforced concrete is also available.
Waste treatment processes	H. Mannisto, E. Sebbas and E.N. Westerberg, "Energy vs Environment - Friends or foes", Canadian Pulp and Paper Association Technical Section, Environment Improvement Conference, Montreal, 6-8 October 1976, Pre-printed Proceedings (Montreal, P.Q.), pp. 27-34	A case study of a single-line bleached kraft mill with a batch digester shows that a reduction in the pollutant load of effluents can be accomplished by in-plant controls and external treatment without increasing mill energy consumption. In-plant measures to minimize the water pollutant load include: closing the water system of the wet drum barkers; increasing the active alkali charge to the digester; closing the water system for pulp screening and adjusting water usage to an optimum dilution factor; closing the bleach plant water system; stripping the condensates from the digester and evaporator to allow reuse in brown stock washing and causticizing; and collecting and returning spills to process streams. The increase in the process heat consumption due to the in-plant measures is about 850,000 BTU/short ton of air-dry bleached pulp. The increase in power consumption is estimated to be 15 and 20 kWh/short ton for in-plant measures and external treatment, respectively. Because of more efficient recovery of the dissolved dry solids, the steam generation in the recovery boiler is increased by about 1,000,000 BTU/short ton. The power required for combined in-plant measures and

Subject	Source	Description
Waste treatment processes	J. Orivuori, E. Sebbas and E.N. Westerberg, "Waste heat for evaporation of effluents", Canadian Pulp and Paper Association, Environment Improvement Conference, Montreal, 6-8 October 1976. Preprinted Proceedings (Montreal, P.Q.), pp. 55-60	external treatment can be generated as the by-product power. The heat consumption to generate 35 kw-hr/short ton is about 130,000 BTU/short ton, assuming heat consumption for back-pressure power generation is 3,600 BTU/kWh. After power generation, the increase in steam generation is thus 870,000 BTU/short ton, which corresponds almost exactly to the increase in process heat consumption. A newsprint mill using 80 per cent groundwood and 20 per cent chemical pulp examined the feasibility of using waste heat generated in a closed water system for effluent evaporation. Heat balance calculations for the groundwood mill (power consumption 1,200 kWh/short ton of air-dry product with 15 per cent loss to the atmosphere and 30 per cent to vapour flash) show that there is a waste heat of 2,300,000 BTU/short ton which has to be removed by cooling of the groundwood mill's recycled water. The amount of water recirculating in the groundwood pulp mill is about 13,000 gal/short ton. This water volume must be cooled from 158 F (maximum allowable temperature of the groundwood pulp slurry) to 136 F (temperature of the paper machine white water) in order to keep the in- and out-going process heat flows in balance. Since there is no need for hot process water, and the temperature of the waste heat is relatively high, it is possible to utilize the heat for evaporation of the effluent. The reuse water from the ground-water mill is cooled in a heat exchanger and the waste heat is transferred to the effluent evaporator. An evaporation plant using waste heat would consume about 30-40 kWh/1,000 gal water. Preliminary cost estimates show costs of waste heat evaporation comparable with costs of external treatment methods.
Waste treatment processes	M.R. Overcash and F.J. Humerik, "State-of-the-art: swine waste production and pretreatment processes", National Technical Information Service, Springfield, VA 22161 (No. PB-267 995, December 1976)	A review of waste sources and pretreatment processes in the swine processing industry was presented as an over-all evaluation of various experimental and demonstration data. Various aspects of swine waste management and swine production are discussed, including housing types, the magnitude and distribution of swine, and population characteristics. Properties of swine waste and production unit waste load are presented for wastes from drylot and pasture production units and for concrete slab and slotted floor-pit wastes. Factors evaluated include type and size of animal, waste volume, solids content, nitrogen, cations, anions, bacteria and miscellaneous parameters. Various pretreatment processes are discussed with respect to altering the land-limiting constituents of swine waste, treatment for partial reuse, and complete recycling or reuse of swine wastes. Treatment processes for altering the land-limiting constituents include anaerobic lagoons, mechanically aerated lagoons, naturally facultative lagoons, rainfall runoff retention ponds, oxidation ditches, and overland flow. Treatment processes for partial reuse include high-rate anaerobic digestion with methane production, solids separation, pyrolysis, and refeeding processes.

Subject	Source	Description
Water in plants	C.F. Musil, C.H. Bornman, and J.O. Grunow, "Some observed interrelationships between the cover of aquatic vegetation and various physical properties of the water medium", <i>Journal of South African Botany</i> , vol. 42, No. 2 (1976), pp. 157-169	High pH and oxygen but low total carbon dioxide values were recorded from water at sites containing high percentage covers of predominantly submerged aquatic vegetation. The converse was true in water at sites containing very dense covers of predominantly rooted-floating and free-floating aquatic vegetation. The cover of submerged aquatic vegetation was influenced by the turbidity of the water and also by shading, particularly by that of floating aquatic vegetation.
Water in plants	W. Shepherd, "Indices of plant water status: some comparisons within and between crop species", <i>The Journal of Applied Ecology</i> (Australia), vol. 13, No. 1 (April 1976), pp. 205-209	The effects of plant water status on physiological processes have been widely studied using four indices of plant moisture: ratio of plant water content to dry weight, sap osmotic potential, leaf water potential, and leaf water vapour resistance. Relationships between the various indices are complex, but are important because of their relevance to crop growth modelling, studies of water movement in plants, and the resistance of plants to drought. Some relationships between the indices and transpiration have already been reported. This paper considers further data from potato, barley, and wheat crops, giving particular consideration to differences between crops grown under conditions of plentiful and limited water supply. The four indices were determined for the upper third of the canopy, and for the low part, the remainder of the leaves. The results are presented. The relationships were different for upper and lower levels of plants, and different crop species, grown under various water regimes. Crops raised with a limited water supply developed in ways that tend to restrict transpiration during subsequent periods of drought.
Water law and institutions	E.A. Ackerman and G.O. Lof, "Emerging technology and administrative organization for water development", in <i>Technology in American Water Development</i> , (Baltimore, Md., Johns Hopkins Press), pp. 628-657	Administrative means are needed for using new technology in a co-ordinated manner to aid in efficient water resources development and management. The authors strongly urge creation of regional administrative units which would be co-ordinated where necessary by an overriding national body. The most appropriate technical aids will differ from region to region. Among those discussed are: (1) weather modification; (2) desalting; (3) reuse of industrial and municipal water; (4) evaporation control; (5) water transfer; and (6) mining groundwater. Numerous administrative problems that have resulted from increased technology are explored, but the most pressing is the need for co-ordination and centralization of water management among federal, state, local and private sectors. Co-ordination is essential because of: (1) the increasing differentiation of water problems among the regions; (2) the need for different techniques among the regions; and (3) the eminent feasibility of administering water development on a regional basis. In addition, the federal establishment may be a better technical leader if it is less of an entrepreneur. By having both national and regional agencies, the most appropriate body is able to handle a particular management problem as it occurs.

Subject	Source	Description
Water law and institutions	E.M. Borgese, "International Ocean Institute", <i>Oceans</i> , vol. 10, No. 1 (January 1977), pp. 52-57	Increased accessibility to the ocean's vast resources made possible by the technological revolution makes an international race for exploitation with consequent conflict and pollution inevitable. Since the old law of the sea based on the sovereignty of coastal states within a three-mile territorial limit is inadequate, a new concept, the common heritage of mankind, should take its place. The United Nations helped to found the international Ocean Institute at the University of Malta. The purpose of the Institute is to study the establishment of a new international order in the oceans and to propose new approaches and solutions. The Institute held a seminar on pollution of the Mediterranean and examined the existing pollution control legislation in all the Mediterranean States. The Institute's three-step plan for the Mediterranean area includes: (1) strengthening of existing regional bodies and institutions; (2) creating new bodies for regulating unregulated uses of marine areas; and (3) co-ordination of the policies of the various agencies and Governments involved. The Institute's work is not limited to the Mediterranean: studies of a new international economic order and of the law of the sea convention are also under way.
Water law and institutions	T.A. Clingan, Jr., "Four monographs for the general reader (World Oceans, Law of the Oceans, Institutional Arrangements for the Law of the Sea, Work of the Third United Nations Conference on the Law of the Sea)", Sea Grant Special Report No. 10, February 1977	Man has just begun to utilize the natural resources of the sea. These four monographs examine the physical and political difficulties involved in the use of oceanic resources and the international law that must deal with these problems. The old international law based on custom, combined with the unilateral actions and bilateral agreements of some nations, was often unable to deal with modern problems. In an effort to resolve these conflicts, the United Nations held a series of three conferences on the law of the sea. The first, held in 1958, resulted in four conventions dealing with high seas, territorial sea, continental shelf, and fishing and conservation. None has been widely ratified. The second, in 1960, resolved nothing. The third conference, to be held soon, must deal with the peaceful exploitation of living and non-living resources, and the preservation of the marine environment. The principle of the "common heritage of mankind" must compete with the rights of States and individuals to have access to oceanic resources. The author believes that a treaty will emerge from the conference only if each country is willing to make some extremely painful decisions.
Water law and institutions	S.W. Hays, "The effects of the 200-mile United States fishing zone", <i>Louisiana Law Review</i> , vol. 37, No. 4 (Spring 1977), pp. 852-874	Increased consumer demand and new technological developments, such as processing and freezing at sea, improved synthetic webbing in net fishing, and new frozen fish products have created the need for fisheries conservation. Four United Nations conferences on the Law of the Sea have failed to decide the breadth of the territorial sea and the interests of coastal States in the fishery resources of their coasts. To hasten negotiations, the Conference adopted a negotiating text which advocated a 200-mile exclusive economic zone. Recognizing that any fishery management treaty would provide some type of economic zone, Congress passed the Fishery

Subject	Source	Description
Water law and institutions	B.H. Oxman, "The Third United Nations Conference on the Law of the Sea: the 1976 New York sessions", <i>The American Journal of International Law</i> , vol. 71 (April 1977), pp. 247-269	Conservation and Management Act which established a 200-mile fishery conservation zone around the United States. Foreign nations began enacting their own 200-mile zones, implicitly ratifying the United States' action. The author assesses the impact of the Act on the anadromous sedentary and highly migratory fish species, and on the coastal fishing industry and the Gulf Coast fishing industry. The Act finally provides the United States with a statutory basis from which to develop and enforce a unified fishery management plan.
Water law and institutions	"Report of the United Nations Water Conference, Mar del Plata, 14-25 March 1977", New York, United Nations Water Conference	The purpose of the United Nations Conference on the Law of the Sea was to formulate an international treaty. There are two major problem areas which must be resolved before any treaty can be finalized. The first problem is the dispute between the industrialized and developing nations over exploitation of deep sea-bed mineral resources. The author indicates this is largely symbolic since each nation has individual interests. Ultimately, what must be settled is how the sea-beds will be partitioned while preserving a universal right to their use. The second problem is the proposed creation of 200-mile economic zones surrounding coastal States. Concern here centres on whether these States will attempt to assert power beyond the areas allowed, i.e. fishing rights, vessel pollution, some scientific research. For most purposes, the economic zone would retain the same status as high seas. The author concludes that a settling of these problems and final passage of the treaty will contribute not only to agreement concerning the sea, but also to increasing world-wide stability and consequently to a decrease in international tensions.
Water law and institutions	M. Ruivo, "Oceanography and Law of the Sea", <i>UNESCO Courier</i> , vol. 30 (January 1977), pp. 10-13	The Mar Del Plata Action Plan made recommendations in the following areas: assessment of water resources; water use and efficiency; environment, health and pollution control; policy, planning and management; natural hazards; public information, education, training and research; regional co-operation; international co-operation; specific regional recommendations. It also adopted resolutions on the following topics: assessment of water resources; community water supply; agricultural water use; research and development of industrial technologies; role of water in combating desertification; technical co-operation among developing countries in the water sector; river commissions; institutional arrangements for international co-operation in the water sector; financing arrangements for international co-operation in the water sector; water policies in the occupied territories.
		As marine science is increasingly applied for peaceful as well as military and security purposes, contradictions arise between maritime practice and traditional maritime law. To resolve such conflicts, two Conferences on the Law of the Sea developed provisions for regulation of scientific research. The guidelines maintained the prin-

Water law and
institutions

R. Winner, "Marine Scientific research and the Law of the Sea Conference: Some proposed amendments to the revised text", Technical Report WHOI 76-80, Woods Hole Oceanographic Institution, MA (WHOI), September 1976

ciple of freedom of the seas except for the Continental Shelf area and provided that coastal States should not normally withhold consent to a legitimate research request as long as that State could participate. However, newly independent nations question the equity of the proposals. Recently, through agencies such as UNESCO's Intergovernmental Oceanographic Commission, cooperation in oceanographic research, although still dominated by industrialized countries, has increased in all continents. Developing countries remain uneasy about research regulations because they are convinced of their need to control and benefit from the information derived from research activities to protect their interests, including national defense. Success of the new rules for oceanographic research depends upon negotiation and compromise in a spirit of international cooperation.

International treaty provisions and negotiations affecting marine scientific research are under consideration at the fifth session of the United Nations Conference on the Law of the Sea. The author addresses those aspects of the negotiations that directly affect marine scientific research. He bases his analysis principally upon a study of the first single negotiating text produced at the third session, contrasting this with the revised single negotiating text produced by the Conference at the fourth session. Topics discussed include: (1) the nature of the divergent interests the treaty negotiations are trying to conciliate; (2) the treaty provisions and international law dealing with marine research before the Third Conference; (3) the direction indicated by the third session negotiations; and (4) recommended amendments to the revised text. Particularly examined are the texts of the three committees on the conference. Committee I deals with the law of the deep sea bed beyond the claims of national sovereignty; Committee II has responsibility for defining the geographic limits of, and substantive rights within, the territorial sea, economic zone, and high sea. Committee III is concerned with marine environmental protection and preservation, marine scientific research, and technology transfer.

Water quality
control

Proceedings of the International symposium on marine pollution research, National Technical Information Service, Springfield, VA 22161 (No. PB-267 601, January 1976)

Symposium papers discuss how man's activities have affected natural resources of a coastal environment. Participants, discussing international aspects of coastal pollution, reviewed the current status of research and procedures planned to minimize offshore coastal damage. Subjects included: "An Overview of the United States Environmental Protection Agency (USEPA) Programme in Marine Pollution Research", Carl R. Gerber; "Responsibilities for Marine Pollution Research Within Federal Agencies of the United States", Norman L. Richards; "Overview of Marine Pollution Research in the Baltic", K. Rozdzynski; "Marine Pollution Research in Yugoslavia: An Overview", V. Pravdic; "Over-

Subject	Source	Description
Water quality control	S.K. El-Wakeel, "Overview of marine pollution research in Egypt", <i>Proceedings of the International Symposium on Marine Pollution Research</i> , held at Gulf Breeze, Florida, 27-29 January 1976 (EPA Report No. EPA-600/9-76-032, January 1976)	view of Marine Pollution Research in Egypt", Saad El-Wakeel; "Overview on Pollution in the Coastal Environment of Pakistan and its Possible Implication for the Marine Ecosystem", S.M. Haq; "Overviews on Marine Pollution in India", K. Rangar Rao; "Research Needs Concerning Pollution of the Marine Benthos", R.C. Swartz; "Hydrological, Chemical and Physical Processes Affecting Pollution of the Baltic Sea", A. Trzosinska; "Investigation of Pollution-stressed Littoral Communities in the Northern Adriatic", D. Zavodnik; "Microbiology and Chemistry of Estuarine Surface Microlayers", A.W. Bourquin and D.G. Ahearn; "Survival of Viruses in the Marine Environment", George E. Schaiberger, Charles P. Gerba and Enrique G. Estevez; "Relationship of Marine Pollution to Human Health", Ronald Engle; "Bioassays as Indicators of Pollution Effects", David L. Coppage.
Water quality control	S.M. Haq, "Overview on pollution in the coastal environment of Pakistan and its possible implication for the marine ecosystem", <i>Proceedings of the International Symposium on Marine Pollution Research</i> , held at Gulf Breeze, Florida, 27-29 January 1976 (Report No. EPA-600/9-76-032, January 1976)	Several Egyptian institutions are involved in aquatic pollution problems, especially the Water Pollution Laboratory at the National Research Centre, Cairo. Their main areas of interest are water quality and industrial waste in the Nile and its tributaries. The untreated sewage of central Alexandria (over 2 million inhabitants) is discharged into the sea through a pipe constructed in 1954. There are, additionally, several emergency openings along the coastline. Thus, it is possible that the Alexandria beaches will be the first national recreation area to be polluted, with the anticipated effect on area sea food. One third of Egypt's industrial activity is located in the government of Alexandria where several factory complexes exist, mainly an oil refinery, paper mills, textile and cement manufacture, chemical industries and copper works. An oil pipeline terminal, connecting the Gulf of Suez with the Mediterranean, will reach the sea about 50 km west of Alexandria and will transport about 80 million tons annually, with a possible increase to 120 million tons. Although all precautions have been taken, there is still the possibility of oil spills at this site during loading operations. In view of this situation, two inter-institutional projects on aquatic pollution have been recommended to the Council of Environmental Research. They are: effect of sewage disposal in the sea on the water quality along the beaches of Alexandria and pollution control in Lake Maryout. Pakistan has a 880-km long coastline with more than 51,800 sq km of area as part of the continental shelf. There is evidence that both natural factors and man's activities in the Karachi region are effecting drastic changes in its environment. To deal with problems of resource conservation and protection of coastal environments, it is imperative that factors complementing the change be thoroughly examined. The Government of Pakistan, recognizing the importance of all types of pollution on human health and on future resources, has recently established a Man and Biosphere Committee

Subject	Source	Description
Water quality control	K.R. Rao, "Overviews on Marine Pollution in India", <i>Proceedings of the International Symposium on Marine Pollution Research</i> , held at Gulf Breeze, Florida, 27-29 January 1976 (EPA Report No. EPA-600/9-76-032, January 1976)	at the national level. The object of this committee is to initiate steps to study various aspects of environmental hazards caused by human activities and to develop measures for controlling future environmental pollution.
Water resources planning	J.F. Dwyer, J.R. Kelly and M.D. Bowes, "Improved procedures for valuation of the contribution of recreation to national economic development", National Technical Information Service, Springfield, VA 22161 (No. PB-274 446, September 1977)	India is the second most populous and the seventh largest country in the world. It has a coastline of 6,083 km. Marine pollution is associated with the drainage of domestic and industrial wastes directly into coastal waters or indirectly via river waters. Since independence, India has launched and is making significant progress in programmes for socio-economic development. Associated with the progress in industrial development and exploration of new energy reserves and pest control, there is evidence of environmental pollution. The belief that environmental disruption affects less developed countries in a lesser way is not well founded. Highly industrial pockets and overpopulated towns exist in the coastal areas, where marine pollution phenomena often appear with unparalleled intensity unless adequate preventive measures are adopted. Pollution is certainly a symptom of modernity which comes well in advance of other more desirable features of industrialization. Therefore, developing countries such as India have more opportunity to operate on a preventive basis than developed countries.
		Improved procedures are presented for evaluating the contribution of recreation to national economic development. These procedures are to replace those outlined in the Principles and Standards for Planning Water and Related Land Resources. Desirable criteria for valuation procedures are specified. Variation procedures currently used by federal agencies make almost exclusive use of the "interim unit day value approach", sometimes augmented by point systems. This approach has little theoretical or empirical justification and modification of the "interim unit day value approach" and the use of point systems is not a useful method of developing improved procedures. Rather, it is recommended that models be developed to predict individual willingness-to-pay for many types of recreation as functions of site characteristics, the characteristics of the individual user (including the history of previous use), the availability of substitute activities and sites, and the location of the individual in relation to the resources under study. The total value of the resource would then be a function of these variables, the number of users, and the distribution of users within the market areas. These functions may be derived from regional travel cost demand functions (which would also provide estimates of use) or could be explicit willingness-to-pay functions derived from the survey method (which must be supplemented by a use estimate). Examples of the desired models are provided along with guidelines for their development and use. Needs for further research are identified.

Subject	Source	Description
Water yield improvement	T.E. Gass, "Well redevelopment: Part II", <i>Water Well Journal</i> , vol. 31, No. 10 (October 1977), pp. 20-21	Clogging of a well screen and the adjacent formation due to iron bacteria is caused by slimy organic material produced by the bacteria and the iron deposits associated with the organism. These materials may combine with scale minerals such as calcium carbonate. Treatment must, therefore, include a bactericide as well as a strong acid to dissolve scale. Hydroxyacetic acid can be used as such a dual-purpose agent, but many drillers prefer a three-step treatment method involving shock chlorination, acidization, and a final shock chlorination. Potassium permanganate is a strong oxidizing agent that can also be used to treat incrustation. For removing silt and clay from a well, sequestering agents such as sodium phosphate can be used to disperse small particles, making them easier to pump out. Surfactants, or wetting agents, can be used to enhance the dispersing efficiency of sequestering agents for the removal of silt and clay. Explosives and sonic well cleaning are two mechanical methods that can be employed in cases where chemical means are inapplicable. No matter what causes declines in well yield, it is always easier to redevelop the well if the problem is diagnosed early and treatment is applied before the well deteriorates to below 50 per cent of original specific capacity.

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